The Eating Attitudes Test: psychometric features and clinical correlates

DAVID M. GARNER,[1] MARION P. OLMSTED, YVONNE BOHR
AND PAUL E. GARFINKEL

From the Clarke Institute of Psychiatry and the University of Toronto, Canada

SYNOPSIS Psychometric and clinical correlates of the Eating Attitudes Test (EAT) are described for a large sample of female anorexia nervosa ($N = 160$) and female comparison ($N = 140$) subjects. An abbreviated 26-item version of the EAT (EAT-26) is proposed, based on a factor analysis of the original scale (EAT-40). The EAT-26 is highly correlated with the EAT-40 ($r = 0.98$) and the three factors form subscales which are meaningfully related to bulimia, weight, body-image variables and psychological symptoms. Whereas there are no differences between bulimic and restricter anorexia nervosa patients on the total EAT-26 and EAT-40 scores, these groups do indicate significant differences on EAT-26 factors. Norms for the anorexia nervosa and female comparison subjects are presented for the EAT-26, EAT-40 and the EAT-26 factors. It is concluded that the EAT-26 is a reliable, valid and economical instrument which may be useful as an objective measure of the symptoms of anorexia nervosa.

INTRODUCTION

Increasing interest in the objective measurement of the symptoms and psychophysiological features of anorexia nervosa is reflected in the development of several rating scales over the past decade. Slade (1973) originally proposed an observer rating scale for assessing anorexic behaviour patterns in an in-patient setting. Goldberg *et al.* (1980) developed a 63-item self-report measure of anorexic attitudes and behaviour, also designed strictly for use in hospital. Fichter & Keeser (1980) have devised a self-rating scale for assessing several aspects of anorexic behaviour; however, validation was not reported for English speaking subjects.

The Eating Attitudes Test (EAT) has been proposed as an objective, self-report measure of the symptoms of anorexia nervosa (Garner & Garfinkel, 1979). It has been used as a screening instrument for detecting previously undiagnosed cases of anorexia nervosa in populations at high risk for the disorder (Garner & Garfinkel, 1980). Garner & Garfinkel (1980) found that EAT scores were independent of weight but were related to emotional disturbance, as measured by

the HSCL (Derogatis *et al.* 1974), in samples of anorexic patients and dance students. Button & Whitehouse (1981) administered the EAT to a large sample of students at a College of Technology and reported that the instrument was useful in identifying a group with abnormal concerns with eating and weight. Thompson & Schwartz (1982) used the EAT to identify college women with abnormal eating concerns who were later distinguished from anorexic patients in terms of social adjustment. Hawkins & Clement (1980a) organized items from the EAT into subscales measuring dieting and food preoccupation; however, subscales were not empirically derived or validated. We have found that anorexic subjects who markedly overestimate their body size on an operational measure of body-image (Garner *et al.* 1976) have significantly higher EAT scores than those who moderately overestimate or underestimate their size (Garner & Garfinkel, 1981). Hood *et al.* (1982) reported that high EAT scores were related to external locus of control for a group of anorexia nervosa patients.

Although the initial reliability and validity of the EAT have been reported (Garner & Garfinkel, 1979), the relationship between symptom areas and clinical features of anorexia

[1] Address for correspondence: Dr David M. Garner, Clarke Institute of Psychiatry, 250 College Street, Toronto, Ontario M5T 1R8, Canada.

nervosa has not been established. The total EAT score is derived from a heterogeneous item pool, and while it may indicate the overall level of symptoms it does not provide item clusters which may relate to clinical characteristics of interest. Moreover, while the entire scale or various items have been employed in recent studies, questions regarding psychometric qualities, including factor structure and short-forms, have been raised. The purpose of this paper is to describe a factor analysis of the EAT on a large sample of anorexic patients and to determine whether item clusters are associated with clinical and personality features.

METHOD

Subjects

The anorexia nervosa (AN) sample consisted of 160 female patients who were consecutive consultations seen at the Clarke Institute of Psychiatry. Diagnosis was made according to a modified version of the Feighner *et al.* (1972) criteria (Garfinkel & Garner, 1982). The mean age of the sample was 21·5 years (S.D. = 5·4). The sample was heterogeneous in that patients were at various stages of illness when tested, although none could be considered recovered. Approximately one half (48%) of the patients were of the 'restricter' subtype and the remainder had the complication of bulimia. Bulimia was defined, following Garfinkel *et al.* (1980, p. 1037), as 'episodes of excessive ingestion of large quantities of food that the patient viewed as ego-alien and beyond her control'. The mean duration of illness for the entire sample was 4·3 years, and there were no differences between the bulimic and restricter subtypes in age or duration of illness. While the entire sample was 74·1% of average weight for age and height (Health and Welfare Canada, 1954), the bulimics were heavier than the restricters (80·2% *v.* 67·5% of average weight: $t = 5·24$, $P < 0·001$).

The female comparison (FC) group consisted of 140 female university students from first- and second-year psychology courses. They were asked to complete the questionnaire during a regular class session; participation was voluntary and 98% of the subjects approached agreed to complete the questionnaire. The mean age of the FC group was 20·3 (S.D. = 2·7) and they had a mean of 96·6% of average weight for age and height (Health and Welfare Canada, 1954).

Procedures

Following an initial consultation, the EAT and the instruments listed below were administered to the AN patients. The number of AN subjects receiving individual tests varied, since the psychometric battery administered to the subjects has changed over time. However, for each measure below there were no significant EAT score differences between the group for whom data were available and the group for whom data were unavailable. The FC subjects only completed the EAT. The EAT was scored according to the procedure described by Garner & Garfinkel (1979).

The Distorting Photograph Technique (DPT) has been employed as one measure of body-image (Garner *et al.* 1976; Garfinkel *et al.* 1979; Strober, 1981). This allows the subject to estimate her body width using a photograph which can be distorted along the horizontal axis. Both self-estimates and ideal estimates were obtained.

Body Dissatisfaction Scale (BDS) is an adapted version of the Berscheid *et al.* (1973) scale. It consists of a list of 18 body parts, and the subject is instructed to indicate her degree of satisfaction with her own body on a 6-point scale (extremely, quite or somewhat satisfied, somewhat, quite or extremely dissatisfied). Dissatisfaction on this scale has been found to correlate with overestimation on the DPT ($r = 0·48$, $P < 0·007$) and a measure of self-esteem ($r = 0·65$, $P < 0·001$) in a small sample of anorexic patients (Garner & Garfinkel, 1981).

A body-image composite score. Body-image is a multidimensional concept which has been operationalized in different ways. In anorexia nervosa, body-image disturbances have been defined as an overestimation of one's own size, preference for a 'thin' ideal image, and negative attitudes towards one's body (Garner & Garfinkel, 1981). All of these aspects of body-image were incorporated into a body-image composite score which was calculated for each subject by summing the standardized DPT self-estimate, DPT ideal-estimate (after reversing the sign so that a thin ideal reflects disturbance) and BDS

scores. Thus a high score indicated body-image disturbance from an aggregate of measures (i.e. self-overestimation, thin ideal, and high BDS).

Locus of Control Scale is a 3 factor scale, described by Reid & Ware (1973). The rationale for its use in studies of anorexia nervosa was described previously by Garner *et al.* (1976).

Hopkins Symptom Check List (HSCL) is a 58-item self-report index yielding subscores for depression, anxiety, interpersonal sensitivity, obsessionality, and somatization (Derogatis *et al.* 1974). Results with the HSCL have previously been reported for patients with anorexia nervosa (Halmi *et al.* 1977; Goldberg *et al.* 1977; Garner & Garfinkel, 1980).

In addition, demographic and clinical features such as age of onset, duration of illness, percentage of average weight at testing, previous minimum and maximum adult weights, and frequency of bulimic episodes were determined for all patients.

RESULTS

Following Strober's (1981) caveat suggesting that, within a heterogeneous patient sample, age and duration of illness may serve as confounding variables, we performed a preliminary correlational analysis to determine the relationship between the EAT score and those clinical features. None of the dependent or independent variables in this study was significantly related to the subjects' ages or the duration of illness in the patient sample.

The EAT was analysed in two stages: first, a factor analysis was performed; this was followed by a correlational analysis of the total scale, factor scores, clinical and other psychometric variables.

Factor analysis

The 40 items of the EAT were factor analysed for the sample of 160 anorexia nervosa patients. Three factors were extracted accounting for 40·2% of the total variance; the number of factors derived was determined by the scree test, described by Cattell (1966). An oblique rotation was performed and the items with factor loadings of 0·40 or above (in absolute value) are reported in Table 1. Fourteen items did not load on any of the factors. Four items (numbers 4, 9,

14, 25) loaded approximately equally on Factors I and II and, after inspection of the item content, were retained only on Factor I.

Items loading on the first factor, labelled 'dieting', relate to an avoidance of fattening foods and a preoccupation with being thinner. The second factor, 'bulimia and food preoccupation', consists of items reflecting thoughts about food as well as those indicating bulimia. Items on the third factor, 'oral control', relate to self-control of eating and the perceived pressure from others to gain weight. Factors I and II are polar opposites and seem to reflect the desire to restrict food intake found in all patients and the bulimia experienced by a specific subgroup. The 14 items not loading on the 3 factors were eliminated, leaving a new 26-item scale (EAT-26) which was included in the correlational analysis.

Comparison of EAT-26 and EAT-40

Table 2 indicates the mean differences between the AN and FC groups on the EAT-40, EAT-26 and EAT-26 factor scores,[1] as well as differences between bulimic and restricter subsamples of the anorexia nervosa group. While bulimic and restricter patients did not differ in total EAT-40 or EAT-26 scores, the bulimics scored significantly higher on Factor II and lower on Factor III than the restricters. Raw scores corresponding to percentiles for both the AN and FC groups are presented in Table 3. Since bulimic and restricter subgroups differed significantly on Factors II and III, their norms are reported separately.

Table 3 also indicates the standardized reliability coefficients (Cronbach's alpha) for both groups for factors, the EAT-26 and the EAT-40. A 'cut-off score' of 30 has been established for the EAT-40 (Garner & Garfinkel, 1979). With the present sample, a cut-off score of 20 on the EAT-26 correctly classifies a similar proportion of AN and FC subjects according to group membership. Using a discriminant function analysis, the overall percentage of cases correctly classified on the basis of total score was 84·9% for the EAT-40 and 83·6% for the EAT-26.

Correlational analysis of the EAT

Table 4 presents the correlational analysis between the EAT (EAT-40, EAT-26, and

[1] Unit weights were used to calculate factor scores.

Table 1. *EAT-40 factor structure*

Item number	Item content	Corrected item total correlation	Factor loading
	Factor I: Dieting		
37	Engage in dieting behaviour	0·71	0·72
30	Eat diet foods	0·61	0·69
36	Feel uncomfortable after eating sweets	0·64	0·68
39	Enjoy trying new rich foods	0·44	0·66
29	Avoid foods with sugar in them	0·55	0·64
10	Particularly avoid foods with high carbohydrate content	0·54	0·58
15	Am preoccupied with a desire to be thinner	0·69	0·51
38	Like my stomach to be empty	0·62	0·48
22	Think about burning up calories when I exercise	0·67	0·47
14	Feel extremely guilty after eating	0·68	0·46
4	Am terrified about being overweight	0·65	0·45
25	Am preoccupied with the thought of having fat on my body	0·66	0·45
9	Aware of the calorie content of foods that I eat	0·45	0·45
	Factor II: Bulimia and food preoccupation		
40	Have the impulse to vomit after meals	0·59	0·78
13	Vomit after I have eaten	0·45	0·75
7	Have gone on eating binges where I feel that I may not be able to stop	0·51	0·63
34	Give too much time and thought to food	0·71	0·60
6	Find myself preoccupied with food	0·65	0·59
31	Feel that food controls my life	0·66	0·55
	Factor III: Oral control		
8	Cut my food into small pieces	0·62	0·81
26	Take longer than others to eat meals	0·59	0·69
24	Other people think that I am too thin	0·50	0·69
12	Feel that others would prefer if I ate more	0·64	0·62
33	Feel that others pressure me to eat	0·64	0·62
5	Avoid eating when I am hungry	0·54	0·52
32	Display self-control around food	0·46	0·41

EAT-26 factors) and psychometric as well as clinical features within the AN sample. The total EAT-40 and EAT-26 have similar significant relationships with body-image variables and HSCL scores, but are unrelated to bulimia and the percentage of average weight. Factor I is significantly related to body-image variables, but unrelated to bulimia. Factor II is similar to Factor I in its relationship to body-image variables but, unlike Factor I, Factor II is strongly related to bulimia, a heavier body weight and total symptoms on the HSCL. Factor III is negatively related to the percentage of average weight and to bulimia. It is not significantly related to body-image variables or other psychometric tests. The Body-image composite score is a better predictor of total EAT score and factor scores (except for Factor III) than the individual body-image variables.

The intercorrelations between EAT variables suggest that the EAT-26 is highly predictive of the total EAT-40 ($r = 0.98$) (Table 5). Moreover, the EAT-26 maintains as robust a correlation with clinical and psychometric variables as the original scale, indicating that the 14 items eliminated from the EAT-40 are redundant and do not increase the instrument's predictive capability. Factor I of the EAT-26 has the highest correlation with the total EAT-26 ($r = 0.93$). Factors II ($r = 0.64$) and III ($r = 0.60$) have a weaker positive relationship to the EAT-26 total scale score, with Factor III

Table 2. *Mean EAT variable scores for anorexia nervosa (AN) versus female comparison (FC) groups and bulimic (B) versus restricter (R) groups*

	AN (N = 160)		FC (N = 140)			
	Mean	(S.D.)	Mean	(S.D.)	t value*	P value†
EAT-40	52·9	(23·0)	15·4	(11·0)	18·25	< 0·0001
EAT-26	36·1	(17·0)	9·9	(9·2)	16·90	< 0·0001
Factor I	19·9	(10·9)	7·1	(7·2)	12·13	< 0·0001
Factor II	8·0	(5·2)	1·0	(2·1)	15·65	< 0·0001
Factor III	8·3	(5·8)	1·9	(2·1)	12·91	< 0·0001

	AN (B) (N = 83)		AN (R) (N = 77)			
	Mean	(S.D.)	Mean	(S.D.)	t value*	P value†
EAT-40	55·5	(21.0)	50·1	(24·9)	0·49	NS
EAT-26	38·4	(15·0)	33·7	(18·7)	0·46	NS
Factor I	20·8	(10·1)	18·8	(11·8)	0·42	NS
Factor II	10·6	(4·8)	5·2	(4·1)	7·78	< 0·0001
Factor III	7·0	(5·7)	9·7	(5·5)	−3·12	< 0·002

* *t*-test using separate variance estimate when group variance difference is significant ($P < 0.05$).

† Significance levels must be adjusted in consideration of the 'error rate' for a family of multiple comparisons (Myers, 1979). If 0·001 is employed as the critical P value for individual comparisons, the error rate for each set of 5 comparisons is 0·005.

Table 3. *Norms: raw scores corresponding to percentiles for the EAT-26 and EAT-40 for anorexia nervosa (AN) and female comparison (FC) groups*

	Factor I		Factor II		Factor III		EAT-26		EAT-40	
Percentile	AN	FC	AN	FC	AN	FC	AN	FC	AN	FC
99	38	26	B*17 ⎱ R 13 ⎰	8	B 20 ⎱ R 18 ⎰	8	69	37	99	49
90	34	18	B 16 ⎱ R 11 ⎰	4	B 16 ⎱ R 17 ⎰	5	58	23	83	31
80	29	14	B 15 ⎱ R 9 ⎰	2	B 12 ⎱ R 16 ⎰	4	50	18	73	24
70	27	9	B 13 ⎱ R 8 ⎰	1	B 10 ⎱ R 13 ⎰	3	46	14	66	19
60	24	6	B 12 R 7		B 8 ⎱ R 11 ⎰	2	42	9	60	15
50	21	4	B 11 R 5		B 5 ⎱ R 10 ⎰	1	36	6	52	11
40	17	3	B 10 ⎱ R 3 ⎰	0	B 4 R 8		32	5	46	9
30	13	2	B 8 R 1		B 3 R 7		28	4	40	8
20	8		B 6 R 0		B 1 ⎱ R 5 ⎰	0	21	2	31	6
10	4	0	B 3 R		B 0 R 2		11	1	19	5
1	0		B 0 R		B R 0		1	0	6	0
Reliability coefficient	0·90	0·86	0·84	0·61	0·83	0·46	0·90	0·83	0·92	0·83

*B, bulimic AN; R, restricter AN.

Table 4. *Correlations between EAT variables, clinical features and psychometric measures for anorexia nervosa*

Variable	(N)	Factor I	Factor II	Factor III	EAT-26	EAT-40
% average weight	(81)	0·22	0·54*	−0·52*	0·13	0·06
Minimum weight	(82)	0·31	0·51*	−0·28	−0·26	−0·17
Maximum weight	(82)	−0·3	0·26	−0·14	0·02	0·02
Duration of illness (months)	(87)	0·12	0·01	0·01	0·09	0·12
Age	(88)	−0·01	−0·02	−0·12	0·03	0·08
Bulimia (frequency)	(87)	−0·08	0·60*	−0·41*	0·09	0·04
Body size estimate	(75)	0·50*	0·36*	−0·10	0·42*	0·41*
Ideal size estimate	(74)	−0·47*	−0·47*	0·25	−0·38*	−0·41*
Body dissatisfaction	(53)	0·41*	0·33	0·23	0·44*	0·45*
Body-image composite score	(50)	0·61*	0·48*	0·07	0·57*	0·56*
Locus of control	(71)	0·19	0·29	−0·03	0·22	0·22
HSCL (Total)	(54)	0·34	0·40*	0·21	0·42*	0·45*
Depression		0·32	0·37	0·18	0·38	0·41*
Anxiety		0·32	0·35	0·12	0·36	0·40
Interpersonal sensitivity		0·25	0·38	0·14	0·33	0·33
Obsessionality		0·28	0·27	0·14	0·31	0·34
Somatization		0·27	0·32	0·39	0·41*	0·45*

*P < 0·001 (for individual comparisons).

Note. Significance levels have been adjusted in consideration of the increased possibility of Type I error for multiple comparisons. Since 95 individual correlations were computed, only individual P values of 0·001 or less were considered to indicate significance. The corresponding family error rate is 0·09. While this value is higher than conventional single comparison error rates, it does represent a compromise between Type I and Type II error rates (Myers, 1979).

Table 5. *Correlations between EAT-40, EAT-26 and EAT 26 factors for anorexia nervosa (AN) and female comparison groups (FC)*

		AN (N = 160)				
		EAT-40	EAT-26	Factor I	Factor II	Factor III
	EAT-40	—	0·98*	0·91*	0·59*	0·63*
	EAT-26	0·97*	—	0·93*	0·64*	0·60*
FC	Factor I	0·94*	0·97*	—	0·51*	0·39*
(N = 140)	Factor II	0·66*	0·67*	0·60*	—	0·02
	Factor III	0·42*	0·44*	0·27*	−0·03	—

* P < 0·001.

accounting for only 36% of the variance in the EAT-26.

DISCUSSION

A previous report described 7 factors on the EAT (Garner & Garfinkel, 1979); however, in the current study we chose to extract the smallest number of factors that was justifiable on statistical grounds. This factor analysis indicated that the original 40-item scale may be abbreviated to provide a multi-factoral 26-item scale (EAT-26) which correlates highly with the original scale (r = 0·98). Items were eliminated which did not load significantly on any of the 3 rotated factors and the score on the EAT-26 involves simply summing the scores for items

loading on the 3 factors. It was concluded that the 14 items eliminated from the EAT-40 were redundant, and did not increase the scale's predictive power.

The results from the factor analysis of the EAT must be viewed with caution, since it has been recommended that the number of subjects should be 10 times the number of items included in the analysis (Nunnally, 1967). Nevertheless, the results from this tentative factor analysis indicate that the EAT may be divided into 3 distinct clusters of items. While there were no differences between bulimic and restricter subtypes on total EAT score, these groups did differ on 2 of the 3 EAT factors described in the current study.

The factor accounting for the largest amount

of variance in the total EAT-26 was labelled 'dieting' and reflects a pathological avoidance of fattening foods and shape preoccupations. While factor I is associated with several parameters of the multidimensional body-image construct, it is not related to bulimia. AN subjects who score highly on Factor I may be described as over-estimators of their body size who are dissatisfied with their shape and desire to be smaller. Factor I is extremely reliable (alpha = 0·90) and is highly correlated with the total EAT-26 ($r = 0·93$). Thus it could be used as an economical (13-item) substitute for the total scale in some circumstances. Factor II was labelled 'bulimia and food preoccupation' and, while similar to Factor I in its relationship to body-image distur-bances, it differs in that it is positively related to bulimia and a heavier body weight. Since these characteristics have been associated with poor prognosis (Garfinkel *et al.* 1977; Slade & Russell, 1973), it could be hypothesized that high scores on Factor II would be associated with poor outcome. Factor III was labelled 'oral control' and was largely comprised of items reflecting self-control about food as well as those which acknowledge social pressure to gain weight. High scores on Factor III are related to a lower weight and the absence of bulimia. Again, because of the previous findings of a negative relationship between prognosis and both self-overestimation and bulimia (Garfinkel *et al.* 1977), it could be postulated that Factor III would be associated with a favourable prognosis. Items on Factor III acknowledge social forces in the environment and thus high scores may indicate social aware-ness or responsiveness, which have been found to reflect a good outcome (Crisp *et al.* 1979).

Norms have been presented for both the EAT-40 and the EAT-26 for a sample of anorexia nervosa patients as well as a comparison group of college females. The anorexic and female comparison groups have significantly different mean EAT-40 and EAT-26 total scores. Both the EAT-40 and EAT-26 display acceptable criterion-related validity by significantly predict-ing group membership. The reliability (internal consistency) of the EAT-26 is high (alpha = 0·90 for the AN group), even though this scale is much shorter than the original EAT-40.

Because of the association with clinical and psychometric features, it could be postulated that a particular configuration of factor scores

on the EAT-26 could be a sensitive predictor of outcome. Specifically, low scores on Factor II and high scores on Factor III may be better predictors of favourable outcome than the total scale score. However, as yet, outcome data are not available to test this hypothesis.

Recent reports have indicated that cases of extreme dieting and bulimia are relatively common among female university students (Hawkins & Clement, 1980*b*; Wardle, 1980). While these studies have suggested an analogy between the forms of behaviour observed in their samples and those observed in anorexia nervosa patients, their assessment measures have not been standardized on subjects with eating disorders.

The EAT has been validated with anorexia nervosa patients but has also been useful in identifying eating disturbances in non-clinical samples (Garner & Garfinkel, 1980; Button & Whitehouse, 1981; Thompson & Schwartz, 1982). While most individuals from these non-clinical groups who score highly on the EAT do not satisfy the diagnostic criteria for anorexia nervosa, the majority have been identified (in personal interviews) as experiencing abnormal eating patterns which interfere with normal psychosocial functioning (Button & White-house, 1981; Garner & Garfinkel, 1979, 1980). Although the EAT may indicate the presence of symptoms common to anorexia nervosa, as has been cautioned previously, it would be inap-propriate to assume that high EAT scores are diagnostic for anorexia nervosa in non-clinical groups (Garner & Garfinkel, 1980; Button & Whitehouse, 1981). While the EAT may indicate the presence of disturbed eating patterns, it does not reveal the motivation or possible psycho-pathology underlying the manifest behaviour.[1] Thus the EAT may be most suitable as either an outcome measure in clinical groups or as a screening instrument in non-clinical settings.

In summary, the results from the current study have indicated associations between scores on the EAT and various clinical and psychometric

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[1] We have recently reported on the development of an instrument, the Eating Disorder Inventory, which is designed to tap specific psychological dimensions observed in anorexia nervosa and bulimia (Garner *et al.* 1982). These psychological features include body-image disturbances, ineffectiveness, interpersonal distrust, fear of psycho-biological maturity and perfectionism, all of which have been identi-fied as fundamental to anorexia nervosa (Bruch, 1973; Crisp, 1980; Selvini-Palazzoli, 1974; and others).

variables. A factor analysis of the EAT-40 has revealed item clusters which relate to specific predictor variables. An abbreviated version of the original scale has been offered (EAT-26) based upon the items which load significantly on the 3 factors. Whereas bulimic and restricter anorexia nervosa patients do not differ on the total EAT-26 or EAT-40 scores, these groups do differ on Factors II and III of the EAT-26. The EAT-40 and EAT-26 are valid and economical instruments which may be useful as objective measures of the symptoms of anorexia nervosa.

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