

# The Eating Disorder Examination Questionnaire: reliability and validity of the Italian version

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## Abstract

**Purpose** To examine the validity and reliability of a new Italian language version of the latest edition of the Eating Disorder Examination Questionnaire (EDE-Q 6.0).

**Methods** The sixth edition of the EDE-Q was translated into Italian and administered to 264 Italian-speaking inpatient and outpatient (257 females in their mid-20s) with eating disorder (75.4% anorexia nervosa) and 216 controls (205 females).

**Results** Internal consistency was high for both the global EDE-Q and all subscale scores. Test–retest reliability was good to excellent (0.66–0.83) for global and subscale scores, and for items assessing key behavioral features of eating disorders (0.55–0.91). Patients with an eating disorder displayed significantly higher EDE-Q scores than controls, demonstrating the good criterion validity of the tool. Confirmatory factor analysis revealed a good fit for a modified seven-item three-factor structure.

**Conclusions** The study showed the good psychometric properties of the new Italian version of the EDE-Q 6.0, and validated its use in Italian eating disorder patients, particularly in young females with anorexia nervosa.

**Keywords** Eating disorder · Questionnaire · Validity · Reliability · Italian translation · Psychometric characteristics

## Introduction

The Eating Disorder Examination Questionnaire (EDE-Q) [1, 2] has been developed as a self-report version of the full-length EDE, a well-established investigator-based interview that is considered the gold standard in assessment of eating disorder psychopathology [3–7]. The significant relationship between EDE and EDE-Q scores has been demonstrated in several comparative studies [1, 8, 9].

Like the EDE, the EDE-Q provides a global score based on four subscales (Restraint, Eating Concern, Shape Concern, and Weight Concern) designed to reflect the severity of the main features of eating disorder psychopathology. It also assesses key behavioral features of eating disorder, including binge eating, self-induced vomiting, laxative misuse, and excessive exercising. The questionnaire has been extensively studied, and its good psychometric properties have been consistently demonstrated [10, 11], with eating disorder patients scoring significantly higher on the global EDE-Q and subscales than controls [8, 12–16]. Furthermore, the EDE-Q has shown high internal consistency in both non-clinical [17–19] and clinical [20] samples, as well as good test–retest reliability [17, 21, 22], temporal stability [18, 19], convergent validity [8, 23], and sensitivity to change [9].

The four original subscales were clinically derived from patients with anorexia nervosa and bulimia nervosa, grouping together similar items [24], but were not empirically supported. However, the factor structure of the EDE-Q has been evaluated in clinical and non-clinical samples, with the original English version and with translated language versions of the questionnaire, using both exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) [16, 20, 25–33], but results have been very conflicting, and none of these studies replicated the original four-factor structure of the EDE-Q.

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The EDE-Q is also short, comprehensible, and easy to fill in, and an online version has recently been validated [34]. Because of its universal applicability, it has been translated into many different languages, and validated versions are available in Swedish [35], Spanish [36], Greek [37], German [38], Fijian [27], Norwegian [39], Turkish [40], Portuguese [31], Dutch [16], and Mexican [30].

However, the latest version of the EDE-Q (version 6.0) has not yet been translated into Italian, and we, therefore, set out to propose an Italian language version, and to assess its validity and reliability in a large group of Italian-speaking patients with eating disorder.

## Methods

### Participants

The study sample comprised 264 patients (257 females and 7 males; mean BMI  $17.1 \pm 3.4$ ) who met the DSM-5 diagnostic criteria for eating disorder, recruited between January 2013 and December 2014. The DSM-5 diagnosis was carried out by means of clinical interview conducted by experts in the field. Ninety-seven (36.7 %) of the patients were recruited from the inpatient Eating Disorder Unit of Villa Garda Hospital (northern Italy), and 167 from an outpatient Eating Disorder Service based in Verona (Italy).

Two-hundred and sixteen healthy controls (205 females and 11 males) with a BMI  $\geq 18.5$  and  $<30 \text{ kg/m}^2$  (mean BMI  $21.5 \pm 2.1$ ) were recruited from the general population in various community settings. Subjects were excluded from the control group, and if they scored higher or equal to 20 on the Eating Attitudes Test-26 (EAT-26), and/or there was a suspicion or diagnosis of eating disorder, i.e., an affirmative answer to one or both of the following two questions: “Do you have an eating disorder?” and/or “Do you attend a treatment for eating disorders?” ( $N = 7$ ).

The study design was reviewed and approved by the Institutional Review Board of Villa Garda Hospital, Verona, and all participants gave informed written consent for the use of their anonymous personal data. For those under the age of 18, additional informed consent was provided by their parents.

### Measures

#### *The EDE-Q*

The EDE-Q 6.0 is a self-report questionnaire for assessing eating disorder psychopathology and behaviors. It also provides frequency data on key behavioral features of eating disorders, in terms of the number of episodes of the

behavior over the preceding 28 days, and the number of days on which the behavior has occurred. The questionnaire is made up of 22 items, rated on a 7-point forced-choice format (0–6), with higher scores reflecting greater severity or frequency. Items are grouped into subscales, whose scores reflect the severity of key psychopathological features of eating disorder, and the global score is taken as the mean score of the four subscales.

The Italian version was translated from the original English version by experts in the field. The translation process was conducted as follows [41]: (1) forward translation into Italian by a bilingual person; (2) blind back translation into English by a bilingual person; (3) discussion of items by the investigator team to identify any discrepancies and to adjust any inconsistencies; and (4) final approval by the investigators.

The approved Italian version of the EDE-Q was the tested in patients in a real-world setting. All patients were administered the questionnaire before commencing treatment, outpatients during their initial assessment interview, and inpatients on their first day of admission to the Unit (Time 1). A randomly selected subgroup of 19 inpatients had also been administered the questionnaire during the routine initial assessment interview, conducted 1–3 weeks before admission (Time 0), to assess the test–retest reliability of the tool. Treating physicians were blind to these patients’ preadmission EDE-Q scores.

#### *Eating attitudes test-26*

The EAT-26 is a validated eating disorder screening tool [42, 43]. It furnishes a total score ranging from 0 to 78, and a score equal to or higher than 20 indicates that a subject may be at risk of an eating disorder. EAT-26 was, therefore, administered to the control group to exclude any subjects with a total score of 20 or higher.

### Statistical analysis

Internal consistency was calculated for the global EDE-Q and subscales, applying Cronbach’s alpha to the patients’ sample with eating disorders. Pearson’s coefficients were also calculated for the relationships between the four subscales. Spearman rank correlations were used to assess test–retest reliability in the random subgroup of 19 patients who repeated the EDE-Q at Time 1.

Criterion validity was measured using either the two-sample *t* test for independent groups or the Chi-square test, as appropriate, to compare global EDE-Q and subscale scores, and eating disorder behaviors reported by patients with eating disorders and controls.

CFA was performed in the clinical sample using MPlus (version 7; Los Angeles, CA). Three different models

were tested: (1) the general factor model with all items loading on one factor; (2) a four-factor model corresponding to the proposed EDE-Q subscales; and (3) a seven-item three-factor model consistent with previous EFA and CFA results [32, 44] (namely, dietary restraint, body dissatisfaction, and shape/weight overvaluation). Model estimation was based on robust maximum likelihood. Imputation of missing data was based upon full information maximum likelihood. Goodness-of-fit of the relevant model was evaluated on the basis of recommended standards [45, 46]: comparative fit index (CFI, criteria >0.900), Tucker–Lewis index (TLI, criteria >0.900), root-mean-square error of approximation (RMSEA, criteria <0.060), and standardized root mean square residual (SRMR, criteria <0.080).

## Results

As shown in Table 1, the majority of the 264 patients and the 216 controls were single females in their mid-20s. As well as a significantly lower body mass index (BMI), patients had a higher education level than the control group, and were more likely to be single. Of the patients, 199 met the criteria for anorexia nervosa (75.4 %), 39 (14.8 %) for bulimia nervosa, 3 (1.1 %) for binge eating disorder, and 23 (8.7 %) for other specified feeding or eating disorders, (i.e., atypical anorexia nervosa  $N = 10$ ; bulimia nervosa of low frequency and/or limited duration

$N = 6$ ; binge eating disorder of low frequency and/or limited duration  $N = 1$ ; purging disorder  $N = 6$ ).

### Internal consistency

Cronbach's alphas showed good to excellent internal consistency for the global EDE-Q and subscale scores, being in all cases  $\geq 0.79$  (Table 2). Pearson's correlations between EDE-Q subscales were all statistically significant ( $p < 0.05$ ), and ranged from 0.61 (between Restraint and Weight Concern subscales) to 0.86 (between Weight and Shape Concern subscales). Similar results were found after adjusting for the inpatient or outpatient condition (0.59–0.85).

### Test–retest reliability

EDE-Q was administered to 19 patients at Time 0 (initial assessment), and again 7–22 days (mean 10.1 days) later (Time 1, admission). Test–retest reliability of the global EDE-Q score was 0.80, and ranged from 0.66 (Weight Concern) to 0.83 (Restraint) for the subscale scores. Test–retest reliability was good to excellent for all eating disorder behaviors (Table 2).

### Criterion validity

Global EDE-Q and subscale scores are significantly higher, and eating disorder behaviors are significantly more frequent in patients with eating disorders than controls

**Table 1** Baseline characteristics of patients and controls

	Patients ( $N = 264$ )	Controls ( $N = 216$ )	$T$ test or $\chi^2$ test	$p$
Age (years) <sup>a</sup>	22.2 (6.3)	23.3 (10.7)	1.28	0.181
Gender (female) <sup>b</sup>	257 (97.3 %)	205 (94.9 %)	1.96	0.161
Marital status <sup>b</sup>				
Single, never married	248 (93.9 %)	181 (83.8 %)	24.16	<0.001
Married or living as such	11 (4.2 %)	32 (14.8 %)		
Separated or divorced	5 (1.9 %)	0		
Widowed	0	3 (1.4 %)		
Education level <sup>b</sup>				
Middle school	103 (39.0 %)	124 (57.4 %)	16.73	<0.001
High school diploma	130 (49.2 %)	78 (36.1 %)		
Bachelor's degree	31 (11.7 %)	14 (6.5 %)		
Body mass index (kg/m <sup>2</sup> ) <sup>a</sup>	17.1 (3.4)	21.5 (2.1)		
DSM-5 diagnosis <sup>b</sup>				
Anorexia nervosa	199 (75.4 %)		16.12	<0.001
Bulimia nervosa	39 (14.8 %)			
Binge eating disorder	3 (1.1 %)			
Other specified feeding or eating disorders	23 (8.7 %)			
Duration of eating disorder (years) <sup>c</sup>	3.0 (0–30)			

Data are presented as mean (SD)<sup>a</sup>, as frequency (%)<sup>b</sup> or as median (range)<sup>c</sup>

(Table 3). Using ANCOVA's analysis controlling for BMI, educational level, and marital status to compare EDE-Q global score and subscales between patients and controls, we found similar results (EDE-Q global score  $F = 357.89$ ,  $p < 0.001$ ; Restraint  $F = 205.60$ ,  $p < 0.001$ ; Eating Concern  $F = 482.28$ ,  $p < 0.001$ ; Weight Concern  $F = 248.49$ ,  $p < 0.001$ ; Shape Concern  $F = 246.70$ ,  $p < 0.001$ ).

**Table 2** Internal consistency and test–retest reliability for continuous and categorical items in patients with eating disorders ( $n = 264$ )

	Internal consistency, Cronbach's alpha	Test–retest reliability, Spearman's rho
Global EDE-Q score	0.94	0.80**
EDE-Q subscales		
Restraint	0.83	0.83**
Eating concern	0.79	0.80**
Weight concern	0.80	0.66**
Shape concern	0.88	0.80**
Eating disorder behaviors		
Objective bulimic episodes		0.91**
Vomiting episodes		0.82**
Laxative misuse episodes		0.64**
Excessive exercising		0.55*

EDE-Q, Eating Disorder Examination Questionnaire 6.0

\*  $p < 0.01$ ; \*\*  $p < 0.001$

## Construct validity

The CFA for the one factor model provided a poor model fit: CFI = 0.690, TLI = 0.657, RMSEA = 0.129, SRMR = 0.087. Similarly, the CFA indicated that the four-factor EDE-Q original model had a poor fit (CFI = 0.723, TLI = 0.685; RMSEA = 0.124; SRMR = 0.087). However, the fit indices for the seven-item three-factor solution were within the recommended ranges: CFI = 0.979, TLI = 0.961, RMSEA = 0.056, and SRMR = 0.023.

## Discussion

The aim of this study was to propose an Italian translation of the EDE-Q 6.0, and to test its internal consistency, short-term test–retest reliability, and criterion validity in a real-world setting. Results from our large sample of inpatients and outpatients referred for eating disorder treatment by clinical services indicate the strong psychometric properties of the tool [11].

First and foremost, the high Cronbach's alpha coefficients we found for the global and four subscale scores of the EDE-Q, comparable with those observed in other studies on clinical samples [20, 27], suggest the good internal consistency of our Italian version. Furthermore, the test–retest reliability of the global EDE-Q and subscale

**Table 3** Global EDE-Q and subscale scores, and eating disorder behaviors in patients and controls

	Patients ( $N = 264$ )	Controls ( $N = 216$ )	Mann–Whitney or Chi-square test	$p$
Global EDE-Q score <sup>a</sup>	3.4 (1.5)	1.2 (1.1)	18.72	<0.001
EDE-Q subscales <sup>a</sup>				
Restraint	3.4 (1.8)	1.2 (1.3)	15.31	<0.001
Eating concern	3.2 (1.6)	0.5 (0.8)	23.41	<0.001
Weight concern	3.4 (1.7)	1.4 (1.4)	14.25	<0.001
Shape concern	3.8 (1.6)	1.7 (1.6)	14.06	<0.001
Eating disorder behaviors: any occurrence <sup>b</sup>				
Objective bulimic episodes	139 (53.3 %)	68 (31.8 %)	22.07	<0.001
Vomiting episodes	106 (40.2 %)	8 (3.7 %)	87.15	<0.001
Laxative misuse episodes	53 (20.2 %)	7 (3.2 %)	30.95	<0.001
Excessive exercising	100 (38.2 %)	49 (22.7 %)	13.23	0.001
Eating disorder behaviors: regular occurrence <sup>b</sup>				
Objective bulimic episodes	108 (41.4 %)	11 (5.1 %)	82.24	<0.001
Vomiting episodes	87 (33.0 %)	6 (2.8 %)	69.25	<0.001
Laxative misuse episodes	36 (13.7 %)	4 (1.9 %)	21.71	<0.001
Excessive exercising	91 (34.7 %)	20 (9.3 %)	43.09	<0.001

Regular occurrence is defined as  $\geq 4$  episodes over the past 28 days

EDE-Q Eating Disorder Examination Questionnaire 6.0

Data are presented as mean (SD)<sup>a</sup> or as frequency (percentage)<sup>b</sup>

scores was high, albeit slightly lower for the frequency and occurrence of eating disorder behaviors, in particular laxative misuse and excessive exercising episodes. Nevertheless, this is consistent with previous findings, indicating a greater temporal stability in eating disorder psychopathology with respect to eating disorder behaviors [17, 19, 22, 27, 39, 40].

Moreover, our Italian version of the EDE-Q 6.0 effectively distinguished between eating disorder patients and controls. Although the patients assessed in this study were found to have lower global EDE-Q subscales and scores, fewer episodes of laxative misuse, and more episodes of excessive exercising than those of other studies reporting normative data on clinical samples [16, 35], this may be due to cross-cultural differences in the expression of eating disorder symptoms and/or interpretation of the items. Alternatively, the discrepancy may be accounted for by differences in the composition of the clinical samples considered. Indeed, our sample was predominantly made up of patients with anorexia nervosa, and our eating disorder patient scores are comparable with the normative data obtained via the EDE-Q for homogenous groups of anorexia nervosa patients in other samples [16, 35].

Consistently, with all studies evaluating the factor structure of the EDE-Q, the original four-factor structure was not confirmed [28, 29] but similar to other studies [32, 44], and a seven-item three-factor structure was identified. These conflicting findings are due to the fact that the original EDE and EDE-Q subscales were purposely developed, including items collected together on a rational basis to represent the major areas of eating disorder psychopathology [24], rather than on a factor analysis.

The main strength of this study is the fact that it was carried out on a large sample of inpatients and outpatients with eating disorders of clinical severity. However, this study has some limitations. First, our sample was largely composed of patients with anorexia nervosa, and we can provide no data on the validity and reliability of the Italian EDE-Q within distinct patient subgroups (in particular those with binge eating disorder), in males and general populations. Furthermore, we did not attempt to verify whether or not the tool was able to distinguish eating disorder patients from other psychiatric patients, or whether or not it correlated with other measures of eating disorder or general psychopathology.

In conclusion, our results suggest that our Italian version of the EDE-Q 6.0 is a valid and reliable means of assessing eating disorder psychopathology and behavior.

#### Compliance with ethical standards

**Conflict of interest** All authors declare that they have no conflicts of interest.

**Research involving human participants and/or animals** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed consent** Informed consent was obtained from all individual participants included in the study.

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