

# The EDE-Q in Hebrew: Structural and Convergent/Divergent Validity in a Population Sample

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## ABSTRACT

**Background:** The Eating Disorders Examination Questionnaire (EDE-Q), originally written in English, is used to screen for and help diagnose eating disorders (EDs). The purpose of this study was to test a Hebrew version for structural validity, for convergent validity, and screening properties in a non-clinical community sample in Israel.

**Method:** The EDE-Q was translated into Hebrew, with permission, and administered online with other well-used self-report instruments to 292 community volunteers (18% male).

**Results:** Exploratory and confirmatory factor analyses largely confirmed the original factor structure, although weight and shape concerns converged into a single factor. Results indicate good convergent validity and screening properties.

**Conclusions:** The favorable psychometric properties of the EDE-Q found in this study add the Hebrew version to a growing list of EDE-Q translations valid in diverse cultures. This important instrument is now available to Israeli clinicians and researchers and should be used and further explored with larger and more diverse populations.

report questionnaire, the Eating Disorders Examination – Questionnaire (EDE-Q) using the original items and response categories (2). The EDE-Q has been widely used to screen for EDs in population studies (3, 4), and assess symptom severity in clinical samples (5). Research has generally shown that the self-report instrument performs as well as, and sometimes even better than, the clinical interview (6). The EDE-Q is therefore an economical, effective, validated and widely-used tool for clinical use and for screening and research purposes.

The EDE-Q has been translated into many languages including Dutch (7); Spanish (8), Portuguese (9); Persian (10); Italian (11); Chinese (12); Finnish (13); German (14) and Norwegian (15). The EDE (16) and the EDE-Q (17) have been adapted for use with children. EDE-Q norms have been established for adolescents (18, 19), college students (20) and bariatric surgery candidates (21). The questionnaire is thus widely used across and within cultures for screening and diagnostic purposes, and to assess symptomatic change over time.

The original structure of the EDE had five subscales with good internal consistency, that discriminated between normal controls, AN and BN patients (22). The resultant EDE-Q included four factors: Dietary Restraint, Shape Over-evaluation, Weight Over-evaluation and Body Dissatisfaction (23). Subsequently, competing structures were found. A study using the EDE with obese patients, some with an ED, favored a two-factor solution (24). Wade, Byrne and Bryant-Waugh (25) followed a large sample of female twins over adolescence using the EDE, and found that only one factor, Shape and Weight Concerns, showed consistency and stability. Bryne, et al. (26) analyzed the responses of individuals with ED and healthy community volunteers and found that a single factor solution had the best fit. Grilo et al. (20), analyzing the EDE-Q responses of a large sample of male and female undergraduates in the

## INTRODUCTION

The Eating Disorder Examination (EDE) was first formulated as a semi-structured clinical interview schedule (1) and has become widely referred to as the “gold standard” in detecting risk for eating disorders (EDs) and characterizing ED symptomatology. The EDE was then adapted to a self-

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USA, supported a three-factor solution, in which Weight and Shape Over-evaluation were combined.

The EDE-Q has also been used for screening for EDs in non-clinical samples. Quick and Byrd-Bredbenner (27) found different thresholds for men and women undergraduates, and Mond et al. (19) suggested thresholds for male and female adolescents in the community. Penelo et al. (8) found that Mexican adolescents differed by gender as well as by urban and rural locations; urban girls were significantly elevated in their EDE-Q scores relative to urban boys, and to rural girls and boys. Cutoff points appear to be affected by gender, age, ethnicity and sampling base.

The purpose of the current study was to test the EDE-Q in Hebrew for structural validity, as well as convergent validity, in a non-clinical community sample in Israel. An additional goal was to establish its screening properties for Israeli adults.

## METHODS

### PARTICIPANTS

Two hundred and ninety-two community volunteers, aged 19-74 and recruited via social networks ( $M=33.39$ ,  $SD=14.52$ , 18%, or  $n=51$  male), participated in the study. They came from diverse socioeconomic backgrounds, using housing density as a proxy for social economic status. They had a mean of 15.75 years of schooling ( $SD=3.64$ ), and all but 40.1% had a college degree. Participants' BMIs ranged between 15.4 and 42.2 ( $M=23.4$ ,  $SD=4.0$ ). Most (65.1%) were in the BMI range generally defined as normal ( $18.5 < BMI < 25$ ).

### PROCEDURE

The study protocol and informed consent procedure were approved by the IRB. The questionnaires detailed below were completed anonymously online by all participants, who provided consent in the opening screen. The researchers' contact details were published so they could be contacted in the event of queries or difficulties. The data were downloaded into SPSS without identifying personal information. The questionnaires took approximately 30 minutes to complete, and no queries were recorded.

### INSTRUMENTS

1. EDE-Q (2) is a 28-item self-report questionnaire assessing the core symptoms of EDs and a wide range of associated pathology. It assesses the frequency of different forms of inappropriate eating behaviors like

undereating, overeating, dysregulation and compensation. The EDE-Q has four subscales, Dietary Restraint, Eating Concern, Weight Concern, and Shape Concern, each containing five to eight items. The responses to 22 items are rated using a 7-point forced-choice format (0–6), with higher scores reflecting greater severity. The remaining six items about the frequency of weight, shape and use of purging techniques during the past 28 days require open, numerical responses. These are used diagnostically and excluded from factor analysis. The suggested clinical cut-off score for the EDE-Q is four, as calculated by the average of each of the sub-scales and of the global score, for men and women (28). For the screening of non-patient samples, the thresholds suggested for the purpose of identifying caseness vary for different groups. In particular, the cut-off points for the EDE-Q sub-scales tend to be higher for women than for men (27). The EDE-Q was translated into Hebrew with permission from its authors by three bi-lingual English-Hebrew psychologists. A native Hebrew speaker translated it into Hebrew, and a native English speaker independently back-translated it into English. A bi-lingual psychologist identified disparities between the original and the back-translation, which were discussed and resolved. The Hebrew translation is available from the authors on request. Internal consistency for the original subscales was good, with Cronbach's alphas between  $\alpha=.78$  and  $\alpha=.93$ .

2. The Satisfaction with Life Scale (SWLS) (29) includes five items assessing how satisfied the responder feels in general with his or her life. Scores correlate positively with measures of social support, positive affect, resilient personality characteristics and subjective assessments of health (30). Its brevity makes it user-friendly. In the current study the Cronbach's  $\alpha$  was 0.89.
3. The EAT-26 (31) assesses maladaptive eating attitudes and behaviors. It contains 26 items rated on a six-point Likert scale. The three least frequent categories ("never," "rarely," and "sometimes") are given a score of 0, "often" is scored as 1, "usually" is scored as 2, and "always" a score of 3. Its three subscales are Dieting, Bulimia and Oral Control. For screening purposes, the EAT-26 global score of 20 is often used as a cutoff point for putative caseness (32, 33). We used a validated Hebrew translation (34) that has been used widely in Israel for both research and clinical purposes (e.g., 35). In the current study for the EAT-26 global score, Cronbach's  $\alpha$  was 0.89.
4. The DKB-35 (Dresdner Körperbildfragebogen-35 or Dresden Body Image Questionnaire-35; 36) has

recently been translated from German into Hebrew by our research group (37). This instrument assesses body image not only in terms of the thin ideal but also in terms of function, positive enjoyment, and expressiveness. It has 35 items that load onto five subscales: Vitality, Physical Contact, Sexual Fulfillment, Body-Narcissism, and Body Acceptance, with internal consistency estimates ranging from  $\alpha=.73$  to  $\alpha=.90$ .

5. The Figure Rating Scale (FRS) contains an array of seven hand-drawn silhouettes of women that increase linearly in body fat (38). The first silhouette presents a slender woman with little body fat and the seventh an obese woman. Respondents enter a number corresponding to (1) their current body size, (2) their ideal body size, (3) their perception of the most aesthetic woman, and (4) their perception of the healthiest woman. The discrepancies between the current figure and ideal, healthy, and best looking figures are then calculated and serve as measures of body dissatisfaction. Positive scores indicate a desire to be thinner, negative scores indicate a desire to be larger, and 0 indicates satisfaction with body size. The reliability of figure drawings in assessing current and ideal body size has been shown to be satisfactory (39).

The EAT-26, the FRS, the DKB-35 and the SWLS were included to test for convergent validity.

## RESULTS

### EXPLORATORY FACTOR ANALYSIS OF THE EDE-Q

We studied the structural validity of the EDE-Q by performing exploratory factor analysis (EFA), and then confirmatory factor analysis (CFA). The EFA was performed with Varimax rotation, as in the original analysis of the EDE-Q in English (5).

We entered into the EFA 22 of the 28 items, excluding the open-ended items dealing with eating pathology severity, following the original EDE-Q (2).

EFA was first performed restricting the factors to four. The four-factors had Eigen values of 11.2, 1.7, 1.5 and 1.3, respectively, cumulatively explaining 71.6% of the variance. Although statistically the four-factor solution was satisfactory, we decided against it because the items did not group onto the factors in a coherent and interpretable manner.

We then restricted the number of factors to three, requiring items to have a loading of 0.1 or more. When restricted to three factors, the factors had Eigen values of 11.24, 1.71, and 1.52, respectively, with cumulative

**Table 1.** Exploratory Factor Analysis for the EDE-Q – Hebrew version (N=292)

No.	Item	Factor		
		SWC	EC	R
27.	How uncomfortable have you felt seeing your body (for example, seeing your shape in the mirror, in a shop window reflection, while undressing or taking a bath or shower)?	.88		
26.	How dissatisfied have you been with your shape?	.84		
28.	How uncomfortable have you felt about others seeing your shape or figure (for example, in communal changing rooms, when swimming, or wearing tight clothes)?	.81		
25.	How dissatisfied have you been with your weight?	.81		
11.	Have you felt fat?	.77		
12.	Have you had a strong desire to lose weight?	.71		
22.	Has your weight influenced how you think about (judge) yourself as a person?	.70		
23.	Has your shape influenced how you think about (judge) yourself as a person?	.67		
10.	Have you had a definite fear that you might gain weight?	.57		
24.	How much would it have upset you if you had been asked to weigh yourself once a week (no more, or less, often) for the next four weeks?	.52		
6.	Have you had a definite desire to have a totally flat stomach?	.42		
7.	Has thinking about food, eating, or calories made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?		.79	
8.	Has thinking about shape or weight made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?		.78	
9.	Have you had a definite fear of losing control over eating?		.58	
21.	Over the past 28 days, how concerned have you been about other people seeing you eat?		.55	
20.	On what proportion of the times that you have eaten have you felt guilty (felt that you've done wrong) because of its effect on your shape or weight?		.54	
4.	Have you tried to follow definite rules regarding your eating (for example, a calorie limit) in order to influence your shape or weight (whether or not you have succeeded)?			.87
3.	Have you tried to exclude from your diet any foods that you like in order to influence your shape or weight (whether or not you have succeeded)?			.87
1.	Have you been deliberately trying to limit the amount of food you eat to influence your shape or weight (whether or not you have succeeded)?			.81
5.	Have you had a definite desire to have any empty stomach with the aim of influencing your shape or weight?			.55
Cronbach's alpha		.95	.83	.89

WC: Shape & weight concerns; EC: Eating concerns; R: Restraint  
Note: Only factor loadings of over .40 are shown

explained variance of 65.77% (see Table 1). Of the 22 items entered into the EFA, two (items 2 and 19) did not load onto any of the factors, and 20 items are therefore shown in Table 1 below.

### CONFIRMATORY FACTOR ANALYSIS (CFA) OF THE EDE-Q

CFA is the current golden standard for testing whether measures of a construct are consistent with their theoretically or empirically hypothesized structure and for comparing competing structures. We ran CFA in AMOS-23 using the maximum likelihood estimation method. We compared the four-factor CFA model with the three-factor model and found a better fit for the latter (see Table 2). According to CFA, the three-factor solution (see Figure 1) had adequate Goodness of Fit indices.

### CONVERGENT VALIDITY

To test for convergent validity, we calculated Pearson correlations between the EDE-Q global and subscale scores and reported BMI, with measures of disordered eating, and body dissatisfaction, as well as with the SWLS scores and the five DKB-35 subscale scores that assess dimensions of body satisfaction. As can be seen in Table 3, the correlations between BMI and EDE-Q scores were positive and significant, as they were with two of the three EAT-26 sub-scales and total EAT-26 score, the FRS body dissatisfaction discrepancy scores for ideal body size, perceived body aesthetics, and perceived health. EDE-Q scores (total and subscales) correlated negatively with SWLS scores and four of the five DKB-35 subscale scores that assess dimensions of body satisfaction. These significant correlations support the convergent validity of the Hebrew version of the EDE-Q. The Physical Contact subscale of the DKB-35 was not correlated with the EDE-Q subscales or global score, supporting divergent validity.

### CASENESS IDENTIFICATION BY THE EDE-Q

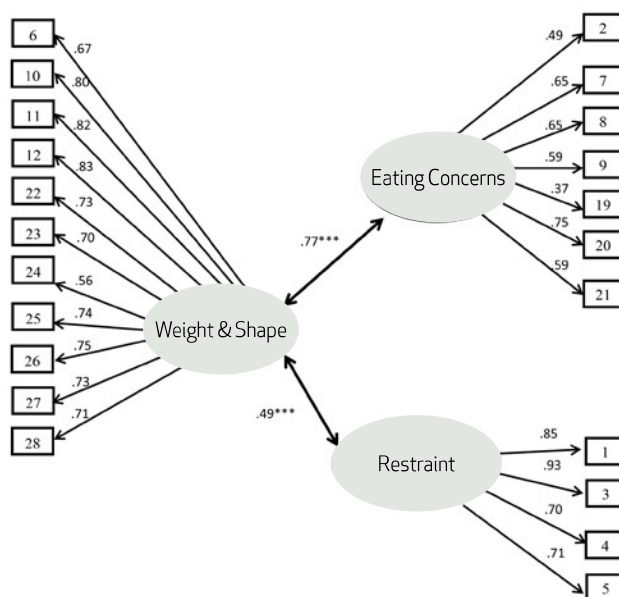
To identify potential ED cases, we used the cutoff point of 20 for global EAT-26 scores, and compared it to the

**Table 2.** CFA: Comparison between the goodness of fit measures for the three- versus the four-factor model of the Hebrew EDE-Q (N=292)

Model	Chi Square (df)	p	SRMR	RMSEA	CFI	TLI
Four factors	1306.8 (170)	.000	.32	.15	.77	.66
Three factors	457.51 (173)	.000	.16	.075	.94	.92

Note: SRMR= Standardized Root Mean Squared Residual; RMSEA = Root Mean Square Error of Approximation; CFI= Chi-square/df; TLI=Tucker Lewis index

**Figure 1.** CFA for the three factor model: EDE-Q – Hebrew version (N=292)



Note: Ellipses represent latent variables. Rectangles represent items in the Hebrew translation of the EDE-Q. All correlations between latent and observed variables were significant at  $p < .05$ .

**Table 3.** Pearson correlations between the EDE-Q and body dissatisfaction subscales (Hebrew versions, N=292)

EDE-Q	Restraint	Eating Concerns	Shape & Weight Concerns	Global score
BMI	.29**	.21**	.37**	.34**
EAT-26 Dieting	.72**	.70**	.73**	.81**
EAT-26 Bulimia	.51**	.73**	.62**	.67**
EAT-26 Oral Control	-.053	.13*	-.07	-.03
EAT-26 global score	.58**	.73**	.63**	.71**
FRS – ideal	.45**	.53**	.70**	.64**
FRS – aesthetic	.46**	.50**	.66**	.62**
FRS – healthy	.43**	.41**	.59**	.55**
DKB-35 Vitality	-.19**	-.37**	-.42**	-.36**
DKB-35 Body Acceptance	-.46**	-.58**	-.79**	-.69**
DKB-35 Body Narcissism	-.09	-.01	-.21**	-.15*
DKB-35 Physical Contact	.07	-.08	-.05	-.01
DKB-35 Sexual Fulfillment	-.16**	-.33**	-.41**	-.33**
SWLS	-.10	-.34**	-.31**	-.26**

Note: \* $p < .05$ ; \*\* $p < .01$  two tailed significance test  
EDE-Q – Eating Disorders Examination Questionnaire; EAT-26 – Eating Attitudes Test-26; FRS – Figure Rating Scale; DKB-35 – Dresden Body Image Questionnaire-35; SWLS – Satisfaction With Life Scale.



threshold score of 4 on the EDE-Q total score as suggested by Quick and Byrd-Bredbenner (27) for undergraduates in the United States.

Using the EAT-26 cutoff point of 20, 27 of the 256 (10.6%) participants who completed both questionnaires had a suspected ED. Using the EDE-Q cutoff point of 4 for the global score, there were more, with 44 (17.2%) seemingly at-risk. Twenty of the 27 cases identified as at-risk by the EAT-26 (74.1%) were also identified as being at-risk by the EDE-Q. Only 20 (45.5%) of the 44 EDE-Q cases identified as being at-risk were also identified by the EAT-26. The test of association between the EAT-26 and the EDE-Q putative cases was  $\chi^2=68.6$   $p<0.0001$ . The Sensitivity of the EDE-Q versus the EAT-26 criterion was therefore  $20/27=74.07\%$  and the Specificity of the EDE-Q versus the EAT-26 was  $205/229=89.5\%$ ; Accuracy was  $225/256$  or  $87.89\%$ .

## DISCUSSION

The purpose of this study was to validate the Hebrew version of the EDE-Q and investigate its psychometric properties. On the whole, the goals of the study were achieved. A three-factor structure that yielded interpretable and reliable subscales was found and confirmed. The EDE-Q total and subscale scores correlated positively with other measures of disordered eating and body dissatisfaction, and negatively with measures of well-being and body satisfaction, indicating convergent validity. The EDE-Q in Hebrew showed good screening properties, identifying more cases at-risk than the EAT-26.

The study is limited by the fact that all participants were adults, since children and adolescents tend to score differently on the EDE-Q. The sample size was adequate for the study goals, but participants included only community volunteers, with a limited number of probable ED cases, and only a small number of males. The EDE-Q in this study was compared to other self-reported measures and there was no diagnostic interview or clinical assessment available as an external criterion. Therefore, whereas we can state that the EDE-Q identified more individuals than the EAT-26 as being at-risk of having an ED, we do not really know which of these instruments is more accurately identifying individuals with a clinically diagnosable ED in accordance with the DSM-5.

The three-factor solution reported in this study was derived by EFA and confirmed by CFA with Goodness to Fit indices. While it does not fully correspond to the factor structure of the English version, this three-factor structure was found for college students, both athletes

and non-athletes, in the United States (20, 40). It is very similar to the four-factor solution put forward by Cooper, Cooper and Fairburn (22) in their original presentation of the EDE-Q, except that the two assessing Shape Concerns and Weight Concerns are merged into a single factor. It is reassuring that the factors are easily interpretable and conform, in the main, to those found for the original EDE-Q. The factors derived in the current analyses have excellent internal consistency, ranging from 0.83 to 0.95, so constitute reliable sub-scales of the EDE-Q (41).

The merging of shape and weight concerns into one factor has been frequently found in studies of EDE-Q structure. Grilo et al. (20) followed American female and male college students and found that shape and weight concerns merged into a single factor; this was also found in a study of Mexican high school youth (8).

Convergent validity was tested by calculating the correlations between the EDE-Q global and subscale scores with those of the EAT-26 (31), the FRS (38) the five subscales of the DKB-35 that indicate body satisfaction (36), and between the EDE-Q and the SWLS (29). Positive and significant correlations were found between global and subscale EDE-Q scores and the EAT-26 total and subscales, the FRS discrepancy measures indicating body dissatisfaction, as well as reported BMI. Negative and significant correlations were found between the EDE-Q scale scores and four of the five subscales of the DKB-35 that indicate body satisfaction (36), and between the EDE-Q and the SWLS (29).

In addition, we tested the association between at-risk status using the threshold of 20 for the EAT-26 and at-risk status using the threshold score of 4 for the EDE-Q total score. The probability of being in both putative “case” groups was very high, and the EDE-Q detected more individuals with a suspected ED than did the EAT-26.

The pattern of correlations between the EDE-Q total and subscale scores and the Dresden Body Image Questionnaire subscales broadens our understanding of the connection between eating symptomatology and several body-related concepts previously not examined in this context. First, Vitality, as measured by the DKB-35, correlated negatively and significantly yet weakly with Restraint, and moderately with Eating Concerns, and with Weight and Shape Concerns. Vitality taps into a feeling of having a healthy, fit and zestful body, rather than a thin one, which is negatively associated with eating pathology. Second, our results show that Sexual Fulfillment has significant, negative associations with eating pathology. Our results support the fact that people who are free and flexible with their food and

eating tend, in general, to be more sexually fulfilled. Third, Body Narcissism, was negatively associated with Shape and Weight Concerns. Body Narcissism is the DKB-35 subscale that measures individuals' enjoyment of showing off their body and being admired for it. Not surprisingly, our enjoyment in having other people look at our bodies is negatively associated with our weight and shape concerns as measured by the EDE-Q. Physical Contact, a subscale of the DKB-35 that measures our use of physical contact and our ease of touching others in a non-sexual social context was the only DKB-35 subscale that was not related to the EDE-Q total or subscales. Thus tendencies to restrict food intake, to be concerned about eating, and to be preoccupied with weight and shape therefore are unrelated to the tendency to touch other people. As might be expected, there are significant gender differences in the EDE-Q subscales and global scores. Many community studies have found that adolescent and adult men in the community have lower scores on the EDE-Q relative to female adolescents and adults (e.g., 8, 20, respectively), and recently a large scale clinical study of male and female adult patients found lower scores for male patients in each diagnostic category and across all ED categories (42). It is reasonable to assume that such gender differences would also be found in the current EDE-Q version, although we did not analyze gender differences due to the relatively small number of male participants in the current study.

In summary, we present both an exploratory and a confirmatory factor analysis of a Hebrew translation of the EDE-Q in a non-clinical sample of Israeli adults, provide evidence of convergent validity, and demonstrate good screening properties. The factor structure of the English version was replicated overall, except that Weight and Shape concerns converged and formed a single factor. The favorable psychometric properties of Hebrew translation of the EDE-Q found in this study add this tool to the growing list of translations shown to be valid in diverse cultures. This useful and effective instrument is now available to Israeli clinicians and researchers and should be used and further explored with larger and more diverse populations.

- All three authors contributed to the conception and design of this study, the collection, analysis and interpretation of the data, and to the writing of the article submitted to the IJP.
- None of the authors have a conflict of interest.
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