Translation and Evaluation of the Reliability and Validity of Eating Disorder Inventory-3 Referral form Questionnaire Among Iranian University Students: A Cross-sectional Study

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Abstract

Background: Undiagnosed eating disorders may lead to a life-threatening condition, then a validated and reliable tool that lets health providers use it for effective screening is a mandatory need.

Objectives: This study aimed to assess the validity and reliability of the Persian version of the Eating Disorder Inventory-3 Referral Form (EDI-3 RF).

Methods: In this cross-sectional study, 452 university students and employees were recruited by convenience sampling from the Iran University of Medical Sciences, Tehran, Iran. The content validity was assessed using the five specialists, and then the content validity index (CVI) and content validity ratio (CVR) was calculated separately. The reliability was measured with Cronbach's alpha and test-retest.

Results: Overall, 260 participants filled out the questionnaire completely. The mean age of participants was 22.34 ± 4.18 years. The mean weight was 64 kg (range: 40 - 115). This version of EDI-3 RF yields acceptable content validity and item correlation. According to the expert's opinion, CVR was more than 0.99 for all inquiries. Also, the CVI for each item was greater than 0.79, which indicates the acceptable value of this index for different items in terms of relevance, clarity, and simplicity. Also, the face validity was approved according to participants' and experts' opinions. Cronbach's alpha for measuring the three subscales of an eating disorder were acceptable (drive for thinness (DT) = 0.76 and 0.77, bulimia (B) = 0.71 and 0.72, and body dissatisfaction (BD) = 0.77 and 0.71, respectively). The correlation coefficient between two questionnaires was 0.48 (P < 0.01). The coefficient between the subscales and whole parts of this questionnaire was 0.58, 0.53, 0.66, 0.48, 0.34, and 0.43, respectively (P < 0.01).

Conclusions: This questionnaire would be a beneficial self-response questionnaire, and because of its abbreviated format, it can be used as a screening and referral tool in the Persian population.

Keywords: Validity, Reliability, Eating Disorder, Inventory, Iran, Psychiatry, Subscales

1. Background

Eating disorders (EDs) that are psychiatric disorders may cause significant and sometimes life-threatening physical conditions (1-3). Diagnostic and Statistical Manual of Mental Disorders 5th edition (DSM-5) defines eating disorders as a group of diseases whose prominent characteristics are severe impairment in eating behaviors (1). This disorder is often considered a feminine illness, while the epidemiologic studies express that the male gender is also at risk of developing this disease (4, 5). Two of the EDs, anorexia and bulimia nervosa, possess the highest mortal-ity rate among the mental disorders and often correlate with depression, severe anxiety, and suicidal ideation (6). However, there is no immediate cure for these disorders, but by a different approach, recovery may earn. The success rate in treatment and recovery relates to disease identification (6, 7). In the last two decades, the study on the etiology, prevention and treatment of EDs has increased significantly. The studies have revealed that the treatment gets more complicated as long as the disease remains undiagnosed (8). For making a diagnosis, there are a variety of eating disorders questionnaires (9). The most used one is EDI-3 (subsequent revisions of Eating Disorder Inventory

(EDI)), including 91 items; it is a self-report measure of psychological traits or constructs that allows the clinician to evaluate eating disorders symptoms, and assist them in providing treatment plans, also, developing required interventions, and monitoring progress in individuals with eating disorders (10). A questionnaire that intensively examines all three eating disorders together and provides an acceptable result will definitely help to advance the treatment of this disorder. According to available research, Eating Disorder Inventory-3 (EDI-3) yields acceptable reliability and validity (11, 12). The validity and reliability of EDI-3 have been evaluated in different languages, e.g., Swedish and Persian (13-15). Eating Disorder Inventory-3 Referral Form (EDI-3 RF) is an abbreviated form of EDI-3; the estimated time for the administration and scoring is approximately 5 - 10 minutes and 15 minutes, respectively (15). It includes 32 items covering three scales that constitute the EDI-3 Eating Disorder Risk Composite (drive for thinness (DT), bulimia (B), body dissatisfaction (BD)) (10). The EDI-3 RF risk estimation is based on diet-related concerns, body weight, weight history, height, and behavioral symptoms suggestive of eating disorders (10). Furthermore, EDI-3 RF yields items for evaluating individuals' psychological state related to weight and eating, personality characteristics, and physical status.

To the best of our knowledge there is no the accurate statistics and the difference in language and norms of this questionnaire in our country in comparison with the original one (English version) and also, considering that completing this questionnaire with lots of items needs expert individuals and is a time-consuming process not only for filling out but for required interpretation promote us to choose this abbreviated form of the most useful ED's screening questionnaire and try to assess the validity and reliability of Persian version of this questionnaire between university students.

2. Methods

2.1. Understudied Population

For this cross-sectional study, 452 students and employees (299 women, 153 men) from the Iran University of Medical Science in Tehran were recruited using convenience sampling. The inclusion criteria were students older than 18 years old and employed in the Iran University of medical sciences. Informed consent was obtained from all participants and the study protocol complied with the ethical guidelines of the declaration of Helsinki. Also, the study was accepted by the ethics committee of Tehran University of Medical Sciences with the registration code of (5253-53- 01-86).

2.2. Eating Disorder Inventory-3 Referral Form Questionnaire

Eating Disorder Inventory-3 Referral Form questionnaire includes 25 items. The responses options based on a 6-point Likert-type scale are: Always, usually, often, sometimes, rarely, and never. Scores in each domain vary from 0 to 4 (poor, fair, good, and excellent, respectively). The responses at the end of the extra indicate the presence of the symptom or dysfunction. However, the query was positive or negative, received four scores, usually or rarely three scores, often or sometimes two scores, and sometimes or often one score. For answers which exclude any dysfunction, zero scores were given.

2.3. Translation

In the first step of the translation process, the questionnaire was translated by one medical specialist and a psychiatrist to Persian (forward translation) and finalized into one united version. In the next step, using the Back translation, the Persian version was translated to the English language by experts that knew both languages (English and Persian) and then compared with the original version to find if any discrepancies existed. If the noticed difference was minor, the necessary revision was applied. Otherwise, the forward translation was repeated.

2.4. Expert Validation

2.4.1. Content Validity

The content validity was assessed using the five specialists, including a psychiatrist, psychologist, sports medicine specialist, and two epidemiologists. After selecting experts, materials on met motivational strategies were sent to these experts, and the research objectives were explained. Then the content validity assessment checklist was sent to them, so its content validity index (CVI) and content validity ratio (CVR) were calculated. To estimate CVI index the Waltz and Bausell formula (Waltz and Bausell 1981) was used. Experts checked the relevance, clarity, and simplicity of each question on a four-point Likert scale that includes; very relevant (4), relevant (3), somehow relevant (2), and irrelevant (1). The CVI was calculated using the following formula.

$$CVI = \frac{Number\ of\ experts\ who\ gave\ a\ score\ of\ 3\ or\ 4\ to\ each\ item}{Total\ number\ of\ experts} \quad (1)$$

According to the Waltz and Bausell formula, the CVI index can be approved if the final score was more than 0.79. Also, the CVR index was calculated using the Lawshe formula (Lawshe 1975). According to the expert's opinion, each question was classified on a 3-point Likert scale of 'The item is necessary,' 'The item is useful but not necessary,'

'The item is not necessary' according to the expert's opinion. Then, the CVR was calculated based on the following formula.

$$CVR = \frac{Ne - \frac{N}{2}}{\frac{N}{2}} \qquad (2)$$

(Ne: Number of experts who have selected the necessary option, N: Total number of experts)

The questions with a CVR index less than 0.99 were excluded from the questionnaire based on the number of experts (five people) and values of the Lawshe table (Lawshe 1975), items whose.

2.4.2. Face Validity and Feasibility

A pilot study using a qualitative approach was designed to test the questionnaire's "face validity and feasibility." Using this approach study, 20 participants randomly received the questionnaire to fill it out, and after that answer, the questions were provided, such as "Did you find any question difficult for understanding?", "Which one?", "How much time did you spend completing it?", "Are the questions appropriate and relevant to the targets?" Also, the expert groups checked the Face validity and feasibility of questions.

2.4.3. Reliability Assessment

Test-retest and Cronbach's alpha coefficient were chosen to determine the reliability and internal consistency.

2.5. Statistical Analysis

The participants had to answer queries individually, and if they had any questions, ask the study observer. The participants were informed about the importance of correct answering and asked to share any doubts or concerns during the completion of the questionnaire. Then the questionnaire was checked to make sure that all queries were answered and each one of them had one answer. Questioners with more than 20% missing were excluded from the study.

The mean values of basic characteristics such as age, marital status, and body mass index (BMI) were calculated for total participants as well as each gender group separately. Also, to find any probable difference between these two groups *t*-test was performed. Moreover, test-retest reliability was assessed via intra-class correlation coefficients ((ICC)-the two-way random model). Cronbach's alpha was used to estimate internal consistency for each subscale. Alpha greater than or equal to 0.6 was considered satisfactory. All statistical analysis was carried out using SPSS software (IBM Corp. Released 2012 IBM SPSS statistics for windows, version 21.0. Armonk NY: IBM Corp).

3. Results

3.1. Descriptive Statistics of Participants

Four hundred fifty-two university students (299 women and 153 men) were recruited for the study, and 260 of them (151 women and 109 men) filled out the questionnaire completely. The mean age of participants was 22.34 ± 4.18 years. The mean weight was 64 kg (range: 40 to 115). The mean participants' height was 168 cm (range: 130 to 193 cm). The mean value of participants' BMI was 22.31 kg/m² (range: 15.62 to 36.69). The basic characteristics of participants have been represented in Table 1.

Table 1. Basic Characteristics of Study Participants [a, b]

Variables	Men	Women
Age (y)	22.19 ± 3.69	22.43 ± 4.41
Marital status (single)	85 (88.5)	123 (84.8)
BMI (kg/m²)		
< 18.5	6 (5.7)	22 (14.9)
18.5 - 25	69 (65.1)	106 (71.6)
> 25	31 (29.2)	20 (13.5)

Abbreviation: BMI, body mass index.
[a] Values were expressed as mean ± SD or No. (%).
[b] In each group of men and women, three participants left this item blank.

3.2. Content Validity Ratio Index

To assess the content validity, the CVR index was calculated for each question using the judgment of the expert's group. Given the number of experts (five experts), if the acceptable CVR value for each item were considered more significant than 0.99, the question would be deleted. According to the expert's opinion, this index was more than 0.99 for all inquiries.

3.3. Content Validity Index

The value of the amount of CVI for each item was greater than 0.79, which indicates the acceptable value of this index for different items in terms of relevance, clarity, and simplicity.

3.4. Face Validity

All questions in the aspect of sensible, appropriate, and relevant of each question were corrected according to participants' and experts' opinions and approved by them.

3.5. Reliability

The reliability assessment of subscales has been shown in Table 2. The ICCs and Cronbach's alpha for measuring the three subscales of an eating disorder were acceptable (DT = 0.76 and 0.77, B = 0.71 and 0.72, and BD = 0.77 and 0.71, respectively). The correlation coefficient between two questionnaires was 0.48 (P < 0.01). The coefficient between the subscales and whole parts of this questionnaire was 0.58, 0.53, 0.66, 0.48, 0.34, and 0.43, respectively (P < 0.01). Also, the Pearson index is shown for each query in Table 3. The test-retest measurement was established by the Pearson correlation coefficient. The values close to +1 or -1 indicate strong relationships in the same or opposite direction, but those close to zero implied less correlation between examined parameters.

Table 2. The Reliability Assessment Regarding Subscales of the Eating Disorder Inventory-3 Referral Form Participants

Variables (EDI-3 RF Subscales)	Item Number	Total (n = 260)
Drive for thinness	7	0.77
Bulimia	8	0.72
Body dissatisfaction	10	0.71

Abbreviation: EDI-3 RF, Eating Disorder Inventory-3 Referral Form.

4. Discussion

Nowadays, the need for objective data on the assessment and treatment of clients has increased significantly (9). One of the most approved questionnaires was EDI, which for the first time, designed by Garner in 1987, had 64 items and eight subscales and has been changed and transformed several times (10). The latest version was EDI-3, introduced in 2004 and accepted by both DSM-IV and ICD-10 (16). Eating Disorder Inventory-3 Referral Form is one of the eating disorder questionnaires applied by experts, and because it is an abbreviated format, it is much more helpful for patient screening. Because main questionnaires have lots of queries and filling out them is time-consuming, then a short questionnaire is the center of interest. But all of them were not approved by DSM or did not earn satisfying validity and reliability. For example, Bulimia Test-Revised, Questionnaire on Eating and Weight Pattern, Eating Disorder Examination Questionnaire, and DSM-5 does not approve questionnaire for eating disorder for all three eating disorders evaluation. According to the expert's opinion, CVR was more than 0.99 for all inquiries. Also, the CVI for each item was greater than 0.79, which indicates the acceptable value of this index for different items in terms of relevance, clarity, and simplicity.

Table 3. Pearson Index for Each Query

Queries Number	Eating Disorders	Pearson Relation Index
1	DT	0.86
2	BD1	0.70
3	B	0.79
4	B	0.80
5	DT	0.66
6	BD1	0.93
7	DT	0.57
8	BD2	0.63
9	DT	0.51
10	BD2	0.69
11	DT	0.60
12	B	0.64
13	BD2	0.64
14	DT	0.87
15	B	0.57
16	BD1	0.73
17	BD1	0.41
18	B	0.47
19	DT	0.74
20	B	0.45
21	BD2	0.51
22	BD1	0.70
23	B	0.30
24	BD2	0.65
25	B	0.63

Abbreviations: DT, drive for thinness; BD, body dissatisfaction; B, bulimia.

The EDI-3 RF questionnaire was examined in this study. Content validity ratio was more than 0.99 for all inquiries. Also, the face validity of this version of questionnaire was approved according to participants' and experts' opinions.

In Stic et al.'s study, in 2000, the validity and reliability of the Eating Disorder Diagnostic Scale (EDDS) were approved, and now this questionnaire is used in all three types of eating disorders; bulimia nervosa and anorexia nervosa and eating disorders not otherwise specified (17). Also, in 2015 another study compared EDI-2 and EDI-3 and reported that EDI-3 successfully distinguished 99% of eating disorder patients while this percent for EDI-2 was 48% (18). Another study assessed the validity and reliability of the Swedish version of EDI-3 in 292 eating disorder patients, 140 psychiatry outpatient clinics, and 648 normal

populations as a control group and showed that the all sub-scales have good reliability except asceticism and analysis of variance showed that EDI-3 differentiate anorexic patients from healthy ones significantly (13). Lee et al. evaluated the Chinese version of EDI, and the results indicated high validity and reliability for this translated version (19).

Persian version of EDI-3 has been evaluated by Dadgostar et al., which showed that generally, the questionnaire yields satisfactory reliability unless asceticism and interpersonal alienation in both men and women. Also, content validity for clarity and relevancy was 0.8 or higher (14). Moreover, Clausen et al. designed a study to establish a national norm and compare the Danish version of EDI-3 with US and international norms (11). A small but significant difference was reported between Danish, international, and US norms. Also, the factor structure was approved, the internal consistency of subscales was acceptable, the discriminative validity was good, and sensitivity and specificity were perfect (11). To the best of our knowledge, the only study has applied EDI-3 RF with other questionnaires to find eating disorder behaviors, and energy status in female dancer students was Robbeson et al. (20). The results showed that the dancer students obtained significantly higher scores in all evaluation questionnaires. For example, EDI-3 DT was (12.0 (3.0; 19.0) vs. 4.5 (2.0; 9.0), P = .023), EDI-3 BD (16.0 (10.0; 25.0) vs. 6.5 (3.0; 14.0), P = .004), and TFEQ-CDR (9.0 (2.0; 15.0) vs. 3.0 (3.0; 7.0), P = .032).

As previously mentioned, in this study EDI-3 RF questionnaire revealed acceptable validity, face validity, and content validity, and the specialist verified the findings. Also, the reliability of this test was satisfying by using Cronbach's alpha, ICC, and test-retest analysis.

Our suggestion for following probable studies is to use more participants for test-retest and use the Kuder-Richardson formula for estimating internal consistency reliability for measures with dichotomous choices.

4.1. Limitations

Limitation of our study is in our sampling method and nature of samples and in sample size that we only studied the university students and another limitation is in the generalization of the results into the general population.

4.2. Conclusions

Based on our study results, we showed the high reliability and validity of EDI-3 referral questionnaire in all subscales. So, this questionnaire would be a beneficial self-response questionnaire, and, because of its abbreviated format, it can be used as a screening for the diagnosis of eating disorders and also as a referral tool in the Persian population.

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