



ORIGINAL ARTICLE

# The Reliability and Validity of the Turkish Version of Food Cravings Questionnaire (FCQ-T) in Major Depressive Disorder Patients

Selen Muftuoglu<sup>1</sup>\*, Gul Kiziltan<sup>1</sup>\*, Mehtap Akcil Ok<sup>1</sup>\*

<sup>1</sup>Baskent University, Institute of Health Sciences, Department of Nutrition and Dietetics, Ankara, Turkey

## ABSTRACT

**Objective:** This study was planned to the reliability and validity of the FCQ-T for use in Turkish patients diagnosed with major depression.

**Methods:** The study was conducted on 203 (144 women, 59 men) patients, aged 20–64 years, who were diagnosed with major depression at three psychiatry centers. Firstly, this study sought to assess the applicability of the FCQ-T in Turkish. In addition, all socio-demographic questions regarding their age, gender, current health status, depression duration, drug use, dieting behaviors were questioned and the anthropometric measurements were made. Confirmatory Factor Analyses were performed with AMOS version 21 and all statistical analyses were performed using SPSS for Windows, Version 17.0.

**Results:** In this study, it was determined that the 39-item FCQ-T scale was collected under 9 factors as originally stated. According to Chi-square Goodness of Fit Index ( $\chi^2=4.27$ ), Adjusted Goodness Of Fit Index (AGFI=0.96), Root Mean Residual (RMR=0.045) and Root Mean Square Error of Approximation (RMSEA=0.068) shown that the FCQ-T has an excellent fit. The level of internal consistency between the items of the FCQ-T was examined by item total correlation was over 0.40 and Cronbach Alpha Internal consistency coefficients was 0.97. Test-retest reliability was found to be 0.98. This value indicates that the FCQ-T is perfectly reliable. Lastly in this study, a positive correlation was found between FCQ-T scores and all foods types (especially sweet and fatty foods), weight, BMI, waist/hip circumference and fat mass (kg).

**Conclusions:** Based on the results of all analyses, Turkish version of the FCQ-T can be used to define eating behaviors and to measure changes in eating behavior for especially depressive individuals.

**Keywords:** Major depression, food craving, eating behavior, validity and reliability analysis

## INTRODUCTION

Major depression is a type of mood disorder which develops as a result of hereditary, environmental or hormonal disturbances (1). World Health Organization (WHO) ranked major depression as number 4<sup>th</sup> on the list of most urgent health problems (2). One in every five women and one in every ten men experience mood disorders at any time in their life in the world (3). This rate

is higher especially in the USA, and almost one in every four people is diagnosed with major depression (4). This rate in Turkey is 17.2% according to Mental Health Profile of Turkey Survey (5). Nutrition related situations such as appetite alterations, increase in the consumption of high caloric foods and weight gain consequently, constipation, dehydration, changes in serum vitamin levels are frequently seen in depressive individuals. Also, antidepressants may influence nutrition habits and weight control (6). Furthermore, change in eating behaviors of these patients may cause various problems in the treatment of depression. It is known that eating behavior is a complex process with internal, environmental and social effects. Studies have been conducted to understand this process and to measure different aspects of eating

**Corresponding author:** Selen Muftuoglu,  
Baskent University, Institute of Health Sciences, Department of Nutrition and Dietetics, Ankara, Turkey  
**E-mail:** selenyilmaz@baskent.edu.tr  
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behavior. Some scales have been developed to measure the problems in this important factor (7-9). One of these scales is the Food Craving Questionnaire.

Food cravings could be defined as frequent, intense and irresistible desires to consume a particular type of food (10). Food cravings differ from hunger by their specificity (i.e., the desire to consume only a particular type of food) and intensity (i.e., high level of desire to consume the food) (11). Accordingly, food craving can be described as an increase in food intake as a result of the physiological or psychological situation, and food craving is frequently associated with mood disorders in the literature (12,13). Based on this description and association, many approaches have been proposed to evaluate the variety of food cravings and among the most commonly used are the Food Cravings Questionnaires (State and Trait), developed by Cepeda-Benito, Gleaves, Williams, & Erath, 2000. This questionnaire was developed from effects of behavioral, cognitive and psychological situations on eating behavior. Based on the psychometric data used in the studies on this subject, different moods such as 'being stressed out' or different physiological situations such as 'abstinence from food for an extended period' are also evaluated in this questionnaire (14,15).

The Food Cravings Questionnaire-State (FCQ-S) aims to investigate state-dependent food craving, that may occur in response to specific situations, for example, stressful events, food cues, momentary physiological-psychological states (e.g., hunger or anxiety); on the other hand the Food Cravings Questionnaire-Trait (FCQ-T) was developed to identify patterns of occurrence and/or characteristics most often related with food-craving behavior, as a psychological trait, in individuals and populations (13,16). Both questionnaires are widely used in England after the completion of all validity and reliability studies (13,14). After then the scale was translated into Spanish (17), German (18), Korean (18), Italian (19) and Portuguese (20) with validation studies and used in these countries.

Despite its potential importance for better understanding and management of depression and eating behaviors such as food craving; there are no validated

instruments to assess food craving behavior in Turkish. The purpose of this study was, adapt the FCQ-T to the Turkish language and reliability and validity of FCQ-T among Turkish populations. We also examined the instrument's internal consistency and test-retest reliability. In addition, and in order to determine the construct validity, we analyzed the relationships between the FCQ-T and several variables (age, gender, anthropometric measurements, and certain foods).

## METHODS

### Participants and Procedures

The population of the study included 203 patients (59 males and 144 females), who volunteered to participate in the study, among those who were diagnosed with major depression at three psychiatric centers between January 2015 and March of 2015. The study protocol was approved by the Research Ethics Committee of Başkent University (protocol number KA14/323). The criteria for inclusion were diagnosed with major depressive disorder and age of was between 20-64 years (mean  $37.1 \pm 11.98$ ). Exclusion criteria included pregnancy and lactation. Participants completed questionnaires within 30-min period. Among the participants, nobody showed any comprehension and/or language difficulties.

### Measurements

In the first part of the questionnaire, participants responded to typical socio-demographic questions regarding their age, gender, current health status, depression duration, drug use, dieting behaviours were questioned. The anthropometric evaluation consisted of measuring height (centimeters), using a stadiometer, and weight (kilograms), using a digital portable scale. Then, from these data, it was calculated the body mass index (BMI) using the following formula:  $\text{weight (kg.)} / [\text{height (m)}]^2$  (21). Participants had a mean BMI of  $26.73 \text{ kg/m}^2$  ( $SD=5.31$ ). Body compositions (fat mass, fat free mass, total body water) were measured with a Tanita MC-780 MA (Tanita Corporation, Tokyo, Japan) bioelectrical scale (22).

Other parts of the questionnaire included Turkish version of the FCQ-Trait consists of 39 questions, divided into nine dimensions: anticipation of positive reinforcement that may result from eating (Pos Reinforcement); anticipation of relief from negative states and feelings as a result of eating (Neg Reinforcement); an intention and planning to consume food (Intentions); cues that may trigger food craving (Cues); thoughts or preoccupation with food (Thoughts); craving as a physiological state (Hunger); lack of control over eating (Lack Control); emotions that may be experienced before or during food cravings or eating (Emotions); and guilt that may be experienced because of cravings and/or giving in to them (Guilt). The answers are recorded on a Likert scale, ranging from 1: never to 6: Always, referring to the frequency with each statement applies to the participant. Thus, the minimum and maximum scores can range from 39 to 234.

### Turkish Adaptation Protocol

To prepare the Turkish version of the questionnaires, we used the back-translation techniques. The translation techniques followed a standardized procedure which the inventory items and scale were translated from English to the target language by a bilingual expert. So, in this study, FCQ-T was translated into Turkish then translated back into in two weeks by three bilingual experts. They evaluated three translations together for consistency, made necessary revisions regarding meaning, syntax, and grammar, and created a final questionnaire in Turkish. This questionnaire was administered to ten faculties from the Department of Nutrition and Dietetics, Faculty of Health Sciences, Başkent University to get their opinions. According to their feedback, it was understood that there were not any obscure items or phrases but only a few misspellings. The questionnaire was finalized with these corrections. Thus, the first Turkish version of the questionnaire was administered to a group of 10 participants to determine face validation. Discrepancies were solved, and the final form of Turkish version of the instrument was developed.

### Data Analysis

Confirmatory Factor Analyses were performed with AMOS version 21 and all statistical analyses were performed using SPSS software. Model fit was evaluated using Adjusted Goodness Of Fit Index (excellent  $\geq 0.96$ ; 0.90-0.95 acceptable;  $< 0.90$  inadequate), Root Mean Square Residual ( $\leq 0.05$  acceptable) and Root Mean Square Error of Approximation (excellent  $\leq 0.06$ ; good  $\leq 0.08$ ; mediocre 0.08-0.10; inadequate  $> 0.10$ ) (Brown, 2015; Schreiber, Stage, King, Nora, & Barlow, 2006).

The factorial structure of FCQ-T was examined by exploratory factor analysis. The internal consistency of the instruments was assessed by using the standardized parameter Cronbach's alpha. Therefore, the reliability was tested using Cronbach's alpha. The Pearson Correlation Analysis was used to test the criterion-related validity of FCQ-T and its test-retest reliability. To examine the nomological validity of the questionnaire, the Spearman correlation test was performed between the FCQ-T scores and other variables. This correlation was calculated by Point-Biserial Method. All tests were two-sided and p values  $< 0.05$  were considered statistically significant.

## RESULTS

The study population (n=203) was composed of 144 females (70.9%) and 59 males (29.1%). The mean age of the patients was  $37.1 \pm 11.98$  years. The depression duration in males and females was  $13.1 \pm 7.78$  months and  $12.5 \pm 7.45$  months, respectively. For female participants, the mean BMI was  $26.8 \pm 5.73$  kg/m<sup>2</sup> (34.0% overweight), whereas for males, the average BMI was  $26.5 \pm 4.12$  kg/m<sup>2</sup> (44.1 % overweight). The median of the number of main meals was 3 (Q1=2, Q3=3) and the median of the number of snacks was 2 (Q1=1, Q3=2). We found that 47.2% of the participants skipped a meal, 61.1% of them gained weight in the last year. Patients gained minimum 1 kg, maximum 20 kg and an average of  $7.04 \pm 4.36$  kg of weight in the last year.

According to the factor analysis (Table 1), was conducted using principal components extraction with

varimax rotation. Various indicators of the high degree of interrelationship between the variables confirmed the suitability of the analysis: Bartlett's test of sphericity gave  $\chi^2=6609$ ;  $p=0.00$ , while the Kaiser-Meyer-Olkin index was 0.94. In this study, we concluded that 39 items in the Turkish version of FCQ were collected under 9 factors as determined in the original questionnaire. Since the factor

load which shows the relationship of each item with the total score was over 0.40 and total variance explained percentage of the factors was over 30% (Table 1).

According to the fit indices (Table 2) and the overall internal consistency of the Turkish version of Food Cravings Questionnaire was considered adequate for the whole sample. According to Chi-square Goodness of Fit

**Table 1. Factor loadings and item statistics of the Turkish versions of Food Cravings Questionnaires.**

Items	Factor 1 Intentions	Factor 2 Positive Reinforcement	Factor 3 Negatif Reinforcement	Factor 4 Lack of control	Factor 5 Thoughts	Factor 6 Hunger	Factor 7 Emotions	Factor 8 Cues	Factor 9 Guilt
Item 5	0.86								
Item 18	0.87								
Item 23	0.75								
Item 9		0.79							
Item 10		0.75							
Item 15		0.74							
Item 24		0.77							
Item 38		0.81							
Item 16			0.86						
Item 19			0.87						
Item 21			0.87						
Item 2				0.80					
Item 3				0.85					
Item 22				0.79					
Item 25				0.80					
Item 26				0.85					
Item 29				0.79					
Item 6					0.84				
Item 8					0.86				
Item 27					0.89				
Item 28					0.75				
Item 31					0.83				
Item 32					0.83				
Item 33					0.85				
Item 11						0.75			
Item 12						0.81			
Item 13						0.78			
Item 14						0.75			
Item 20							0.89		
Item 30							0.84		
Item 34							0.79		
Item 39							0.89		
Item 1								0.79	
Item 35								0.81	
Item 36								0.84	
Item 37								0.88	
Item 4									0.76
Item 7									0.90
Item 17									0.84
Eigenvalue	2.053	3.008	2.26	3.99	4.93	2.40	2.90	2.78	2.11
The percentage of variance explanation	68.43	60.16	75.24	66.350	70.40	60.05	72.70	69.60	70.58

Index ( $\chi^2=4.27$ ), Adjusted Goodness Of Fit Index (AGFI=0.96), Root Mean Residual (RMR=0.045) and Root Mean Square Error of Approximation (RMSEA=0.068), our findings showed that the questionnaire had an

**Table 2.** Fit statistics for the Turkish versions of Food Cravings Questionnaires.

Fit indices	Criteria	Turkish versions of FCQ
$\chi^2/sd$	$3 < \chi^2/sd < 4-5$	4.27
AGFI	$\geq 0.90$	0.96
RMR	$\leq 0.05$	0.045
RMSEA	0.06-0.08	0.068

**Table 3.** Analysis of the scale factor of FCQ-T reliability results

Factor	Corrected-item total score correlation	Cronbach's Alpha if item deleted
Item 1	0.594	0.970
Item 2	0.639	0.970
Item 3	0.669	0.969
Item 4	0.437	0.971
Item 5	0.714	0.969
Item 6	0.798	0.969
Item 7	0.623	0.970
Item 8	0.764	0.969
Item 9	0.727	0.969
Item 10	0.629	0.970
Item 11	0.660	0.969
Item 12	0.569	0.970
Item 13	0.549	0.970
Item 14	0.584	0.970
Item 15	0.453	0.970
Item 16	0.645	0.969
Item 17	0.458	0.970
Item 18	0.746	0.969
Item 19	0.698	0.969
Item 20	0.684	0.969
Item 21	0.720	0.969
Item 22	0.759	0.969
Item 23	0.658	0.969
Item 24	0.568	0.970
Item 25	0.757	0.969
Item 26	0.726	0.969
Item 27	0.786	0.969
Item 28	0.610	0.970
Item 29	0.778	0.969
Item 30	0.615	0.970
Item 31	0.676	0.969
Item 32	0.731	0.969
Item 33	0.713	0.969
Item 34	0.830	0.969
Item 35	0.670	0.969
Item 36	0.720	0.969
Item 37	0.707	0.969
Item 38	0.701	0.969
Item 39	0.666	0.969

excellent fit. The values obtained in the analysis of this questionnaire demonstrated the validity and applicability of adaptation of the questionnaire into Turkish (Table 2).

The correlations between the scores of 9 factors and the total score of the FCQ was analyzed with Pearson's Correlation Coefficient. So positive and strong correlations between total FCQ score and intentions and plans to consume food subscales ( $r=0.88$ ), anticipation of positive reinforcement that may result from eating subscales ( $r=0.82$ ), anticipation of relief from negative states and feelings as a result of eating subscales ( $r=0.81$ ), lack of control over eating subscales ( $r=0.91$ ), thoughts or preoccupation with food subscales ( $r=0.89$ ), craving as a physiological state subscales ( $r=0.79$ ), emotions that may be experienced before or during food cravings or eating subscales ( $r=0.84$ ), cues that may trigger food craving subscales ( $r=0.83$ ) and guilt from cravings and/or giving into them subscales ( $r=0.64$ ) have all been identified ( $p=0.000$ ).

Results from the Turkish samples indicated that the FCQ-T subscales have a high internal consistency and test-retest reliability coefficient. The internal consistency of the FCQ-T and its subscales was determined by calculating Cronbach's alpha coefficient of 0.97. Cronbach's alpha coefficients calculated after exclusion of each item shows that none of the items should be excluded from the questionnaire. As seen in Table 3, correlation of all items with the total score was positive and higher than 0.40. This finding means that the questionnaire as a whole can measure the food craving (Table 3). Additionally; validity coefficients for 9 sub-dimensions of the FCQ-T, which were confirmed in the Confirmatory Factor Analyses, were 0.76 for Factor 1, 0.81 for Factor 2, 0.84 for Factor 3, 0.89 for Factor 4, 0.93 for Factor 5, 0.78 for Factor 6, 0.88 for Factor 7, 0.85 for Factor 8, 0.76 for Factor 9.

The test-retest reliability of the FCQ-T analyzed with Pearson Correlation Coefficient, it was 0.98 and this value shows that FCQ-T is reliable at an excellent level. Additionally, in the analysis of correlations between the sub-dimensions of test-retest, the correlation coefficients were 0.89 for Factor 1, 0.88 for Factor 2, 0.92 for Factor 3, 0.93 for Factor 4, 0.95 for Factor 5, 0.88 for Factor 6, 0.95

**Table 4. Correlations between the scores of FCQ-T and several variables.**

	FCQ Score	
	r	p
Age	-0.010	0.891
Gender <sup>#</sup>	-0.028	0.687
Chronic disease <sup>#</sup>	-0.088	0.212
Antidepressant use <sup>#</sup>	0.007	0.918
Number of main meals	0.024	0.735
Number of snacks	0.075	0.285
Eating speed <sup>#</sup>	0.241	0.001*
Diet treatment <sup>#</sup>	-0.108	0.124
Chocolate and chocolate products	0.147	0.036*
Cream cakes	0.314	0.000*
Chips	0.099	0.160
Carbonated beverages	0.108	0.124
Fast-Food	0.225	0.001*
French fries potatoes	0.202	0.004*
Bread	0.137	0.052
Pasta	0.112	0.113
Pastry	0.252	0.000*
Dried nuts and fruits	0.108	0.125
Ice cream	0.123	0.080
Fruit	0.079	0.263

\*p<0.05, <sup>#</sup>The correlation was calculated by Point-Biserial Method.

**Table 5. Correlations between the scores of FCQ-T and anthropometric measurements.**

	FCQ Score	
	r	p
Body weight	0.154	0.028*
BMI	0.157	0.025*
Waist circumference	0.204	0.005*
Hip circumference	0.203	0.005*
Waist/hip ratio	0.121	0.097
Body fat percentage (%)	0.125	0.088
Body fat tissue (kg)	0.181	0.013*
Lean body mass (kg)	0.033	0.655
Body water (L)	-0.051	0.488

\*p<0.05

for Factor 7, 0.89 for Factor 8, 0.93 for Factor 9. It was seen after these analyses that correlation in all sub-dimensions were positive and statistically strong (p=0.000) (Table 3). The minimum, maximum and average scores obtained from the questionnaire by the patients were 49, 219, and 119.8±40.11, respectively.

Table 4 shows the correlation between FCQ-T scores and some characteristics of the patients. Accordingly, a negative correlation was found between age and FCQ-T score but the differences were not statistically significant

(p>0.05). Also; FCQ-T scores were higher in females than males, in patients with chronic diseases than patients without chronic diseases, in patients using antidepressants than patients not using antidepressants and in patients not receiving diet treatment; but the differences were not statistically significant (p>0.05). Additionally; a positive and statistically significant correlation was found between FCQ-T score and eating speed (r=0.241, p=0.001). A positive and statistically significant correlation was found between FCQ-T score and chocolate and chocolate products, cream cake, pastry, fast food, french-fried potatoes (p<0.05).

Table 5 shows the correlation between FCQ-T scores and anthropometric measurements of the patients. So; a positive and statistically significant correlation was found between FCQ-T score and weight (r=0.154, p=0.028), BMI (r=0.157, p=0.025), waist circumference (r=0.204, p=0.005), hip circumference (r=0.203, p=0.005), and fat tissue (kg) (r=0.181, p=0.013) (Table 5).

## DISCUSSION

The aim of this study was to validate the Turkish version of the Food Craving Questionnaires. The adaptation process started with the translation of the source language into the target language, continued with the identification of linguistic and idiomatic equivalents and conduction of preliminary study. Firstly, the validity and reliability of the questionnaire were analyzed. Accordingly, the correlation level between the items ( $\chi^2=6609$ ; p=0.00) and sample size were analyzed. (KMO=0.94). Accordingly, we applied fit indices ( $\chi^2=4.27$ , AGFI=0.96, RMR=0.045 and RMSEA=0.068) and it showed that the questionnaire had an excellent fit and we found a positive and strong correlation between the scores of 9 factors and the total score of the FCQ-T. Also Cronbach's  $\alpha$  for the whole FCQ was 0.97. Besides, correlations of all items with total score were positive and higher than 0.40. This finding means that the questionnaire as a whole can measure the food craving.

Further, the test-retest reliability coefficient of both total score and nine factors of the questionnaire was

calculated and analyzed with Pearson Correlation Coefficient and it was 0.98. This value shows an excellent reliability of FCQ-T. The minimum, maximum and average scores obtained from the questionnaire of the patients were 49, 219, and  $119.8 \pm 40.11$ , respectively. In the analysis of the questionnaire, high scores indicates increased food craving. Accordingly, it can be said that study participants had medium level food craving.

Studies on food craving in major depression commonly report that not all foods induce food craving and this effect is more pronounced in fatty, salty and sweet products and products with additives (23). Therefore, clinical studies are focused on foods with simple carbohydrates such as chocolate and sugar (12,24). It was observed that these products have measurable psychoactive effects; and anger, tension, and some depressive symptoms were reduced after their consumption (24). It is thought that if nutrition was controlled only with homeostatic systems, everyone should be at their ideal weights; but because of the relationship of award system of the brain with taste and pleasure, individuals tend to consume certain foods excessively (25). Different physiological effects according to consumed food, for instance, the content of the food (sweet and/or fatty), consolidates eating behavior. Also, secretion of various biological substances dopamine foremost affects eating behavior (26).

For instance, clinical studies with brain imaging techniques showed increased dopaminergic activity in the midbrain, ventral striatum, and posterior right amygdala during the consumption of delicious and pleasure giving compared to the consumption of ordinary food. On the other hand, it was determined that the expectation of pleasure giving drink causes an increase in the activity of the amygdala and mediodorsal thalamus. Most of these studies with brain imaging and clinical experiments proposed that this situation is related to the dopaminergic system (27-29). From this perspective, it

has been reported that depressive mood states are related to the increase in food cravings. Particularly foods with high content of sugar, fat, and carbohydrate (30). In this study, as expected, a positive correlation was detected between FCQ-T scores and especially sweet and fatty foods craved by patients.

Besides, we found that patients using antidepressants had higher FCQ-T scores compared to patients not using antidepressants. This finding may be due to the effects of antidepressants on appetite. Moreover, a positive and statistically significant correlation was observed between eating speed and FCQ-T scores. Additionally, patients not receiving diet treatment had higher FCQ-T score, but the differences were not statistically significant. We can say that learning healthy and balanced nutrition may reduce food craving of individuals. In the study, we detected a positive and statistically significant correlation between FCQ-T score and weight, BMI, waist circumference, hip circumference, and fat tissue (kg) ( $p < 0.05$ ). Based on our findings, we can say that food craving negatively affects body composition of the patients. In the same way other studies have identified an increase in food cravings in individuals with increased BMI (31,32).

In conclusion, the adequate fit indices, good internal consistency, and results regarding the construct validation endorse the quality of the instruments validated in this study. Therefore, FCQ-T constitutes a valid instrument to measure the craving for food behavior in the Turkish population. These findings showed that food cravings in depression relationship with anthropometric measurement and some certain food. Future studies need to examine if similar results can be obtained in healthy adults or other life stage groups and may determine cut-off scores for better interpretation of the questionnaire, particularly in clinical practice.

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