

# Reliability and validity of the Turkish version of the short food literacy questionnaire among university students

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**Summary.** The aim of this study was translating and adapting the SFLQ to Turkish and evaluating the validity and reliability for adults in Turkey. In accordance with the purpose of the study, a 2-part questionnaire was prepared. The first part focused on the sociodemographic characteristics, including age, sex, and questions that determine food label reading habits. The second part consisted of the Newest Vital Sign (NVS) test, Turkey Health Literacy SCALE-32 (TSOY-32) and Short Food Literacy Questionnaire (SFLQ). The construct validity of the SFLQ was assessed using factor analysis. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.811. Bartlett's test of sphericity was significant ( $X^2=841.958$ ,  $df=66$ ;  $p<0.001$ ). A Scree plot and eigenvalues determined that one factor should be retained, which accounted for 32.01% of the variance. The questionnaire factor loadings varied between 0.43 and 0.64. Internal consistency was assessed by calculating Cronbach alfa, and the value was 0.803. There was a positive relationship between SFLQ, TSOY-32 and NVS ( $r=0.531$ ,  $p<0.001$ ;  $r=0.294$ ,  $p<0.001$ ). As a results of this study, it can be said that SFLQ is a valid and reliable measurement tool, therefore it can be used to describing food literacy among Turkish adults.

**Key words:** food literacy, validation, health literacy, nutrition

## Introduction

Nutrition knowledge is one of the factors, which affects food behaviors and healthy lifestyle (1). However, the food literacy includes skills we have about food choice, food consumption, food preparation and understanding of food effects on human body. It is defined by the experts "the relative ability to basically understand the nature of food and how it is important to you and how able you are to gain information about food, process it, analyze it and act upon it"(2). Food literacy has the advantage of improving community health such as health literacy, therefore understanding, describing and measuring adults' food literacy level may help for intervention to population (3-5). It is new trend and there is not enough study on food

literacy effect of human health, even so it is shown that food literacy correlated with healthy food consumption (6).

Non-communicable disease are the most common health problems such as obesity, heart disease are related with diet (7). Enhancing lifestyle is depend on physical activity and what we consuming and during life. It has shown that nutrition education has positive effects of consuming healthy food and well-being (8, 9). Food literacy is a new concept to describe food well-being and a way to make healthy community. Despite there is not enough study focus on adult food literacy, adults' food behaviors has major effects on their children's choices and education and how they will act in the future, because of this it is important to target parents (10). However, there are limited studies on this

topic, most of the researches focus on adolescent's food literacy and most of the intervention studies focus on school children (9, 11-13).

"A short food literacy questionnaire (SFLQ) for adults" is first the instrument to measure food literacy among adults (14). This form developed by Krause et al. in Switzerland. It is short, practical and useful for public health, SFLQ is developed for Swiss population, although it could be used for other countries with adaptation to country profile. Food literacy have complex components, even though this questionnaire focuses on the skills and the abilities for healthy food choices (2, 14, 15). This might be practice to measure adults' food literacy and rapid intervention to improve nutrition abilities.

The objective of this study was to translate and to adapt the SFLQ to Turkish and to evaluate the validity and reliability for adults in Turkey.

## Methods

### *Study Group and Procedure*

The methodological study was carried out in Harran University School of Health Vocational School between December 2017 and January 2018 in Şanlıurfa. The study was reviewed and approved by the Harran University Medical Faculty Ethics Committee and Health Vocational School administration. In terms of academic use of the scale, required permission was obtained for the responsible researcher.

The criteria for inclusion in the study were to be between age 18-30, to accept participation in the study, to answer more than 90% of the questionnaire form. The sample size was calculated as 300 people based on the statement "sample size should be 10 to 20 times the number of items in the study questionnaire" (16). All the students who participated in the study were informed about the study and their written approval were obtained. 148 people who don't accepting to participate in the study, being absent when the survey was practiced, and not answering 90% of the questions in the survey were removed from the study group. Finally, the study was conducted with 308 (67,5%) university students.

Due to the adaptation of the scale from different languages and cultures, the validity and reliability

study has been carried out in two stages. In the first stage, the validity of language and coverage, in the second stage construct validity, concurrent criterion validity, internal consistency and test-retest reliability were evaluated.

Stage 1: In accordance with the translation-back translation method, the GSOY Scale were translated into Turkish by two different language experts. Then the Turkish form, which was formed by the co-decision of the two experts, was translated into English by another language expert. For the content validity of the Turkish form, it was presented to 10 experts (an academician doctor, 7 doctors, 2 nutritionist). They were asked to assess the items in four groups: "essential", "somewhat convenient - the revision of the item is required", "It is quite appropriate - but minor changes are necessary", or "unnecessary". The content validity index of items in the questionnaire was 0.67.

Stage 2: Afterwards, a group of 10 students were tested for clarity by applying GSOY Scale and feedback was obtained. The items were understood by the students and no change was requested. After the pilot study, scale was reapplied to 40 students selected from 308 students with an interval of three weeks to evaluate the test-retest reliability

### *Data Collection Tools*

In accordance with the purpose of the study, a 2-part questionnaire was prepared. The first part focused on the sociodemographic characteristics, including age, sex, and questions that determine food label reading habits. The second part was consisted of the Newest Vital Sign (NVS) test, Turkey Health Literacy SCALE-32 (TSOY-32) and Short Food Literacy Questionnaire (SFLQ) (14, 17, 18).

SFLQ was developed by Krause et al (14). This scale which covered crucial elements of nutrition literacy and food literacy definitions has 12-item questionnaire of four- or five-point Likert type. For evaluation, a summary score was calculated that ranged from 7 to 52; the higher score shows the better food literacy. Cronbach's alpha value of SFLQ was 0.82.

TSOY-32 has been developed by Okyay et al. on the basis of the conceptual framework of the European Health literacy Scale study (17). This self-reporting scale was developed to assess people's health

literacy over fifteen years of age with the composition; four-point Likert-type of 32 items. According to score, TSOY-32 was categorized in four categories; inadequate health literacy (0-25), problematic-limited health literacy (>25-33), adequate health literacy (>33-42), excellent health literacy (>42-50).

The NVS is an evidence-based health literacy screening tool that includes a standardized Nutrition Facts label and six accompanying questions, requires basic reading and numeracy skills (18). The ability of a person to read and analyze a nutrition label has been noted to parallel the conceptual and analytic skills, which are needed to understand the majority of health-related instructions. NVS is suitable to be used as a quick screening test for limited literacy in primary health care.

**Analysis**

*Factor Analysis*

Exploratory factor analysis was calculated by using a principal factor method with varimax rotation to evaluate the scale’s construct validity. Factor analysis adequacy was assessed by applying the Kaiser-Meyer-Olkin (KMO). The KMO result was >0.50, and factor analysis was performed. All the items exhibited factor loadings of >0.40 in the analysis, so there was no need to remove items (19). According to the factor loadings obtained from the factor analysis, items pertained to a subdimension according to their maximum factor weight. One dimension was identified by the factor analysis.

*Internal Consistency*

Cronbach a coefficient was calculated to evaluate the scale’s internal consistency, and coefficients were also calculated for the item-total correlation and for

the item elimination. Items which were greater than 0.30 of the total item correlations were considered reliable. None of the items gave values less than 0.30 (20).

*Test-retest reliability*

Test-retest reliability coefficient was calculated to evaluate the scale’s stability over time. The level of agreement between responses at test and retest was measured by using Spearman rank correlation coefficient.

*Statistical Analysis*

SPSS version 21.0 for Windows (SPSS Inc., Chicago, IL, USA) was used for data analysis. The demographic characteristics of the study group were reported using descriptive statistics (frequencies, proportions, mean±SD, Min-Max, median and interquartile range 25%-75% (IQR 25-75)). Initially, the normality of the total scores was tested using the Kolmogorov-Smirnov normality test and graphs. Therefore, the median scores were compared using Kruskal Wallis and Mann-Whitney U tests. The level of agreement between responses at test and retest was measured by using Spearman rank correlation coefficient.

**Results**

A total of 308 student were included in this study. The mean age was 19,94±2,42 years old and 28.2% of the participants were male. Students’ age (r=0,027; p=0,642) and gender (Z=0,003; p=0,998) were not significantly associated with SFLQ score. 85 students (27.6%) reported that they rarely read food labels. In this study, the mean SFLQ score increased with the increase in food label reading habit (p<0,001). The distribution of the SFLQ scores of the study group according to the food label reading habits is given in Table 1.

**Table 1.** The distribution of the SFLQ scores of the study group according to the food label-reading habits

	N (%)	Mean±SD	Min.-Max	Median	IQR 25-75	Test KW	p
Food Label Reading habit presence							
Rarely-non	85 (27,6)	26,32±8,34	9,0-50,0	27,00	19,4-32,0		
Sometimes	115 (37,3)	27,78±7,85	9,0-46,4	27,40	22,0-33,0	22,109	<0,001
Often-very	108 (35,1)	31,83±7,74	14,0-51,0	31,20,00	26,0-37,5		

### Factor Analysis

The construct validity of the SLFQ was assessed by using factor analysis. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.811. Bartlett's test of sphericity was significant ( $X^2=841.958$ ,  $df=66$ ;  $p<0.001$ ). A Scree plot and eigenvalues determined that the factor accounted for 32.01% of the variance should be retained. The questionnaire factor loadings varied between 0.43 and 0.64.

### Internal Consistency

Internal consistency was assessed by calculating Cronbach  $\alpha$  and the value was 0.803. The deletion of any item from the scale produced Cronbach  $\alpha$  values that ranged between 0.77 and 0.79. The corrected item total correlation coefficient ranged between 0.32 and 0.52. The Results of Reliability Analysis, and Factor Loading of the SLFQ Items are given in Table 2.

### Test-Retest Reliability

Three weeks later, the questionnaire was conducted again to 48 student. A high positive correlation was observed between the total scores of the 2 applications using Spearman rank correlation analysis ( $r: 0.808$ ,  $P<0.001$ ). The average score on the first evaluations was  $40,89\pm 6,86$  while the average score on the second evaluations was  $42,61\pm 7,56$ .

### Hypothesis-testing validity

The hypothesis was established that students with higher TSOY-32 and NVS scores would get higher SLFQ scores. 42 students (13,6%) had inadequate health literacy. As the level of health literacy increased, SFLQ total score increased ( $<0,001$ ). There was a positive relationship between SLFQ, TSOY-32 and NVS ( $r=0.531$ ,  $p<0.001$ ;  $r=0.294$ ,  $p<0.001$ ). The distribution of SLFQ scores obtained from the students' health lit-

**Table 2.** The results of reliability analysis, and factor loading of the SLFQ Items

SLFQ Items	1	2	3
1) When I have questions on healthy nutrition, I know where I can find information on this issue	0,563	0,436	0,779
2) In general, how well do you understand the following types of nutritional information? (A) Nutrition information leaflets (B) Food label information (C) TV or radio program on nutrition (D) Oral recommendations regarding nutrition from professionals. (E) Nutrition advice from family members or friends	0,633	0,517	0,780
3) How familiar are you with the Turkey Ministry of Health Food Pyramid?	0,445	0,347	0,787
4) I know the official Turkey Ministry of Health recommendations about fruit and vegetable consumption	0,441	0,348	0,790
5) I know the official Turkey Ministry of Health recommendations about salt intake	0,529	0,427	0,781
6) Think about a usual day: how easy or difficult is it for you to compose a balanced meal at home?	0,430	0,321	0,789
7) In the past, how often were you able to help your family members or a friend if they had questions concerning nutritional issues?	0,575	0,464	0,778
8) There is a lot of information available on healthy nutrition today. How well do you manage to choose the information relevant to you?	0,597	0,468	0,776
9) How easy is it for you to judge if media information on nutritional issues can be trusted?	0,625	0,503	0,772
10) Commercials often relate foods with health. How easy is it for you to judge if the presented associations are appropriate or not?	0,625	0,504	0,772
11) How easy is it for you to evaluate if a specific food is relevant for a healthy diet?	0,642	0,515	0,771
12) How easy is it for you to evaluate the longer-term impact of your dietary habits on your health?	0,622	0,500	0,772

Cronbach  $\alpha$ : 0.801

1: Factor Loading, 2: Corrected Item Total Correlation, 3: If Item Deleted Cronbach  $\alpha$

eracy levels and correlation values of the SLFQ with the NVS are given in Table 3, 4.

**Discussion**

Construct validity refers to whether a scale or test measures the construct adequately. Factor analysis is a method used commonly for evaluating construct validity (20). In this study, the KMO test value was found 0,811. The KMO test result indicated that the SLFQ was reliable, and the Bartlett test result was found statistically significant, which means that the structure of the SLFQ was suitable for factor analysis (21).

Factor loadings of 0.10 were accepted as low, 0.30 as moderate, and values of 0.59 or above are considered high. A high factor loading showed that the item was a valid indicator of the related factor (21). In the current study, it was observed that the factor loading was 0.441 for one item and 0.445 for another item. The rest of the items were greater than 0.5. As a result, the scale could not be separated into components and had a single dimension. These results showed that construct validity of the questionnaire was sufficient. Our results similar with the SLFQ Swiss version, they also had minimum factor loading 0.40 and contribution of factor loading was similar in both study (13). The SLFQ is currently developed and there is no other study on this scale. Although our findings show that scale has similar results with Turkish version, in time new studies will show us factor loading in different populations.

Cronbach’s  $\alpha$  coefficient, which represents internal consistency reliability, should be higher than 0.70 (22). Cronbach’s  $\alpha$  coefficients for the SLFQ were 0.803 for the entire questionnaire and greater than 0.771 for if item deleted Cronbach’s  $\alpha$  (Table 2), which implies that the questionnaire exhibited considerable reliability. This result indicates that the items in the questionnaire are consistent with each other and the items questionnaire contained measured the same characteristic.

Test-retest reliability refers to the correlation coefficient obtained for any variable under similar conditions and after a certain time interval. The test-retest scores less than 0.80 indicated that the participants did not answer the items when they were retested (23). In our study, results of the SLFQ supported the literature and showed that the scale items did not change over time.

Congruent validity was also confirmed via its significant correlation with the SLFQ and NVS. The NVS was one of the instrument to measure the health literacy in adults, which was quickly feasible and acceptable (24, 25). Understanding of healthy food and nutrition literacy associated with the NVS, therefore we used to compare between NVS and SLFQ score (26). 35.1% of participants had adequate literacy and significantly highest SLFQ score. In addition, this showed that SFLQ was associated with the abilities for healthy food choice as it claimed (13).

One of the hypotheses tested in the study was the level of general health literacy correlated with SLFQ scores. In support of the hypothesis, it was found that

**Table 3.** The distribution of SLFQ scores obtained from students according to health literacy level.

	N (%)	Mean±SD	Min.-Max	Median	IQR 25-75	Test KW	p
TSOY-32							
Inadequate Health Literacy	42 (13,6)	23,98±6,44	14,0-44,20	23,90	18,2-27,4	78,265	<0,001
Limited Health Literacy	96 (31,2)	25,46±6,83	9,20-45,6	25,00	23,3-30,4		
Adequate Health Literacy	113 (36,7)	29,76±7,83	9,0-50,0	30,40	25,4-35,8		
Excellent Health Literacy	57 (18,5)	36,07±7,00	19,8-51,0	36,40	31,4-41,4		

**Table 4.** Correlation values of the SLFQ with the NVS

	Mean±SD	Min.-Max	Median	IQR 25-75	Correlation values with SLFQ score	
					r	p
NVS	2,53±1,41	0,0-6,0	2,00	2,0-3,5	0,294	<0,001

general health literacy level was positively correlated with SLFQ scores ( $r=0.531$ ,  $p<0.001$ ). Similarly, positive correlation was found in the original scale study ( $r=0.294$ ,  $p<0.001$ ).

Consequently, it can be said that SLFQ is a valid and reliable measurement tool as a result of the conducted analyzes. However, it should be considered that the study group was consist of university students. Therefore, it is important to conduct studies on different samples for the validity and reliability of the scale.

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