

**Nejati, B., Lin, C-Y., Griffiths, M.D., Pakpour, A. (2019). Using classical test theory and Rasch analysis to examine the Persian Food-Life Questionnaire (Short Form) among overweight and obese breast cancer survivors. *Asia-Pacific Journal of Oncology Nursing*, in press.**

### **Abstract**

**Objective:** In order to assist weight control among women with breast cancer, improving their food attitudes may be an effective method. Therefore, the present study validated a short instrument assessing food attitudes (i.e., the Short Form of the Food-Life Questionnaire; FLQ-SF) among Iranian women with breast cancer who are overweight.

**Methods:** Women with breast cancer who are overweight (n=493; mean±SD age=52.3±10.7 years) participated in the study. All of them completed the FLQ-SF, questions designed using the Theory of Planned Behavior (TPB; including subjective norm, perceived behavioral control, and behavioral intention), and Food Frequency Questionnaire (FFQ). Both classical test theory and Rasch models were used to examine the psychometric properties of the FLQ-SF. More specifically, the factorial structure of the FLQ-SF was assessed using confirmatory factor analysis (CFA), the item fit was examined using the Rasch model, and the concurrent validity was evaluated using the correlation between the FLQ-SF, TPB elements, and FFQ.

**Results:** CFA results confirmed the Persian FLQ-SF as a five-factor structure. Rasch models indicated all the FLQ-SF items fit in the construct of food attitudes. Significant correlations between FLQ-SF and other instruments (TPB elements and FFQ) supported the concurrent validity of the FLQ-SF.

**Conclusions:** The psychometric findings of the present study demonstrated that the Persian FLQ-SF is a reliable and valid instrument. Therefore, the Persian FLQ-SF can be applied to

assess food attitudes among Iranian women with breast cancer who are overweight.

**Keywords:** breast cancer; classical test theory; obesity; food attitude; Rasch model

## Introduction

The health and psychosocial impacts of being overweight on people's health can be severe. More specifically, individuals who are overweight may suffer from both health problems (e.g., high risk of developing type 2 diabetes) and psychological health problems (e.g., increased psychological distress and weight-related self-stigma).<sup>[1,2]</sup> The health problems resulting from being overweight also exist in cancer patients, and the association between mortality and being overweight was found in a study using a prospectively cohort design.<sup>[3]</sup> Among different types of cancer, breast cancer is one of the most common, and is the leading cause of cancer death among women.<sup>[4]</sup> Also, weight gain has been found to be an important issue for oncologists when taking care of women with breast cancer. After having a diagnosis of breast cancer, patients have a 13% increase of breast cancer-specific mortality and a 12% increase of any-cause mortality for every five pounds they gain in weight.<sup>[5]</sup> Therefore, assisting women with breast cancer to control their weight is a priority issue for healthcare providers.

Given that the major contributors for gaining weight are lack of physical activity, high levels of energy intake, and genetic factors,<sup>[6]</sup> dieting appears to be the most appropriate method to assist women with breast cancer in reducing their weight. More specifically, women with breast cancer may not have a high level of energy to engage in physical activity, and there is nothing that can be done concerning their genetic make-up. Consequently, assisting women with breast cancer to select and consume appropriate food is deemed to be an effective method in helping them control their weight.

In order to assist women with breast cancer to select and consume appropriate food, healthcare providers should first understand how cancer patients judge the food (i.e., what is the attitude of cancer patients toward food and related issues). Indeed, Lozano et al.<sup>[7]</sup> stated that attitudes towards food have been shown to guide individuals to select food and their

eating behavior, which consequently influence their general health. Although such attitudes are generally conceptualized as “a summary evaluation of a psychological object captured in such attribute dimensions as good–bad, harmful–beneficial, pleasant–unpleasant, and likeable–dislikeable (p. 28)”<sup>[8]</sup> when Ajzen <sup>[9]</sup> proposed the Theory of Planned Behavior (TPB), attitudes toward food should have specific characteristics apart from the generally defined attitudes. <sup>[10]</sup>

Considering the uniqueness of food attitudes, Aikman et al. <sup>[11]</sup> proposed five domains to describe food attitudes (positive affect, negative affect, abstract cognitive qualities, general sensory qualities, and specific sensory qualities) and developed the Food Attitude Questionnaire in relation to six specific foods. Additionally, Rozin et al. <sup>[12,13]</sup> developed the 25-item Food-Life Questionnaire (FLQ) with a six-domain structure (weight concern, diet and health orientation, belief in a diet-health link, food negativity/food importance, disordered eating characteristics, and natural/vegetarian) to examine the attitudes toward healthy foods (i.e., low fat/salt reduced). The FLQ was then reduced to a short form (i.e., FLQ-SF) with only 22 items (of which the six FLQ domains were reduced to five: weight concerns [WC], diet-health orientation [DHO], diet-health link [DHL], food and pleasure [FP], and natural [N]) to feasibly and quickly assess the food attitudes [10]. Moreover, when compared to the Food Attitude Questionnaire, the FLQ-SF has the advantages of brevity (i.e., 21 items in the FLQ-SF vs. 51 items in the Food Attitude Questionnaire) and broad range of food (i.e., healthy foods in the FLQ-SF vs. six specific foods in the Food Attitude Questionnaire). Given that women with breast cancer may be easily fatigued and find it difficult to complete a long questionnaire, the FLQ-SF appears to be a better choice in helping healthcare providers to understand food attitudes among their patients.

Because the FLQ-SF has never been used in an Iranian context, the primary aim of the present study was to translate the FLQ-SF into a culturally appropriate Persian version.

Additionally, the psychometric properties of Persian FLQ-SF were evaluated to determine whether it could be applicable for research and applied intervention studies on breast cancer patients. More specifically, the psychometric testing included three dimensions: (i) applying two types of test theories, including classical test theory and Rasch analysis, to the Persian FLQ-SF; (ii) using external criteria (TPB elements and different types of food consumption) to examine the concurrent validity of the Persian FLQ-SF; and (iii) constructing regression models to further understand the associations between the Persian FLQ-SF and different types of food consumption when demographics and TPB elements are controlled for.

## **Methods**

### ***Participants and procedure***

Between February 2018 and January 2019, women with breast cancer were recruited from six oncology centers in three cities of Tehran, Qazvin, and Karaj, Iran. Eligible patients were at least 18 years old with a body mass index (BMI)  $> 25$  kg/m<sup>2</sup>, histologically-confirmed breast cancer, the ability to understand Persian, and willingness to participate in the study. Patients with severe cognitive impairment (as assessed by the Mini-Mental State Examination), pregnant, or severe mental diseases were excluded from the study. Only women who were overweight or obese were recruited because the scope of the study was to understand problems among women with breast cancer who were overweight or obese. All procedures of this study involving human subjects were approved by the Ethics Committee of the Qazvin University of Medical Sciences. Written informed consent was obtained from all the participants.

### ***Translation procedure***

The standard steps suggested by the international guidelines were applied to the

translation procedure, including forward translation, backward translation, panel reviewing, and pilot testing. [14,15] For forward translation two bilingual translators who were native Persian speakers independently translated the FLQ-SF into Persian. Following this, the corresponding author and the two translators reconciled the two forward translations into an interim Persian version. For backward translation, the interim Persian version was translated back into English by two native English speakers, who were unaware of the content of the original English FLQ-SF before performing translation. For the panel reviewing, different versions of the FLQ-SF (two forward translations, interim Persian version, and two back translations) were compared and checked for cross-cultural equivalency by an expert committee comprising a psychiatrist, nurse, psychologist, nutritionist, and psychometrician. A prefinal version was then generated. For the pilot testing, 36 patients completed the prefinal version to ensure that the readability and confirmed the final Persian FLQ-SF.

### ***Instrumentation***

*BMI and clinical data:* Weight (kg), height (cm), BMI, hip circumference, and waist circumference were measured by two study researchers using the World Health Organization (WHO) criteria for BMI nutritional status. More specifically, the operational definition of nutritional weight status recommended by the WHO is: 18.5 and below *underweight*; 18.5-24.9 *normal weight*; 25.0-29.9 *pre-obesity (overweight)*; 30.0 and above *obesity* (<http://www.euro.who.int/en/health-topics/disease-prevention/nutrition/a-healthy-lifestyle/body-mass-index-bmi>). Clinical data were collected from patient medical records.

*Food Life Questionnaire-Short Form (FLQ-SF):* The FLQ-SF comprises 22 items distributed across six domains (WC with 6 items; DHO with 5 items; DHL with 4 items; FP with 4 items; and N with 3 items). All items were rated on a 7-point Likert scale (1 = *strongly disagree*; 7 =

*strongly agree*), and a higher score indicates more weight concerns (for WC domain), higher diet-health orientation (for DHO domain), better diet-health link (for DHL domain), greater food and pleasure (for FP domain), or more natural (for N domain). The internal consistency of the FLQ-SF was adequate for the entire FLQ-SF score ( $\alpha = 0.75$ ) and each FLQ-SF domain score ( $\alpha = 0.83$  for WC, 0.67 for DHO, 0.75 for DHL, 0.73 for FP, and 0.82 for N). [10]

*Theory of Planned Behavior (TPB) elements:* All the TPB elements were assessed using the items adopted from Chitsaz et al. [16]: (i) subjective norm was assessed using three items (sample item “*My husband believes that I should eat healthy food*”) rated on a 5-point Likert scale (1 = *strongly disagree*; 5 = *strongly agree*). A higher score indicates a higher level of subjective norm and the internal consistency of subjective norm was very good ( $\alpha = 0.84$ ); (ii) perceived behavioral control (PBC) was assessed using seven items (sample item “*I have complete control over whether I eat healthy food daily during the next month*”) rated on a 5-point Likert scale (1 = *strongly disagree*; 5 = *strongly agree*). A higher score indicates a higher level of PBC and the internal consistency of PBC was excellent ( $\alpha = 0.93$ ); (iii) behavioral intention was assessed using two items (sample item “*In the next month, I intend to eat healthy food everyday*”) rated on a 5-point Likert scale (1 = *strongly disagree*; 5 = *strongly agree*). A higher score indicates a stronger intention to eat healthy food and the internal consistency of behavioral intention was very good ( $\alpha = 0.88$ ). [16]

*Dietary assessment:* Dietary assessment was conducted using a 168-item semi-quantitative food frequency questionnaire (FFQ). The Iranian FFQ includes a list of foods (with standard serving sizes) that are commonly consumed by the Iranians. The frequency reported for each food item was then converted to a daily intake. Following this, portion sizes of consumed

foods were converted to grams and the weight of seasonal items (e.g., some vegetables) was calculated using the number of seasons available in each food.<sup>[17-19]</sup> Although 17 food groups can be generated using the FFQ, the present study only used the following food groups for data analysis: fruit consumption (grams per day), vegetable consumption (grams per day), whole grain consumption (grams per day), and fast food (grams per week).

### ***Statistical analysis***

Psychometric properties of the FLQ-SF were analyzed using two different testing theories: classical test theory and Rasch analysis. In classical test theory, the following analyses were performed: acceptance, confirmatory factor analysis (CFA) using diagonally weighted least squares (WLSMV) estimator, average variance extracted, composite reliability, internal consistency, corrected item-total correlation, standard error of measurement, and ceiling/floor effects. In Rasch analysis (using partial credit model), the following statistics were computed: item difficulty, information-weighted mean-square (infit MnSq), outlier sensitive MnSq, item separation reliability and index, person separation reliability and index, and differential item functioning (DIF). Additionally, DIF was conducted across mean age (< 52 years vs.  $\geq$  52 years) and educational status (educational year > 9 years vs.  $\leq$  9 years). Pearson correlations were conducted to understand the associations between FLQ-SF and several external criteria (subjective norm, PBC, behavioral intention, fruit consumption, vegetable consumption, whole grain consumption, and fast food consumption). Following this, four hierarchical regression models (dependent variables were the consumptions of fruit, vegetable, whole grains, and fast food) were constructed to understand to what extent the FLQ-SF was associated with these dependent variables after controlling for age, gender, BMI, and TPB elements. More specifically, in the Step 1 regression models, behavioral intention was not included. In the Step 2 regression models, all the controlling variables were included.



Regarding the criteria for determining whether the FLQ-SF is a reliable and valid instrument, the following cutoffs were applied to the analyses using classical test theory: a nonsignificant  $\chi^2$ , comparative fit index (CFA) > 0.9, Tucker-Lewis index (TLI) > 0.9, root mean square residual of approximation (RMSEA) < 0.08, and standardized root mean square residual (SRMR) < 0.08 for CFA. [20-24] Also, average variance extracted > 0.5, composite reliability > 0.6, ceiling/floor effects < 20%, internal consistency of Cronbach's  $\alpha$  > 0.7, test-retest reliability using intraclass correlation coefficient (ICC) > 0.4, acceptance (i.e., completion rate in %) > 80, factor loadings derived from CFA > 0.4, and corrected item-total correlation > 0.4 were in anticipation. [25,26] The following cutoffs were applied to the Rasch analysis: item and person separation reliability > 0.7; item and person separation index > 2; [27,28] infit and outfit MnSq between 0.5 and 1.5; DIF contrast < 0.5 across age and educational status. [29,30] The statistics were performed using MPLUS (for CFA), WINSTEP (for Rasch analysis), and SPSS (for other analyses).

## Results

On average, the participants (N = 493) were 52.3 years (SD = 5.7), received 9.1 years of education (SD = 3.7), had breast cancer diagnose for 8.4 years (SD = 6.1). Other characteristics of the participants are presented on Table 1.

(Insert Table 1 here)

The psychometric properties in the item-level were satisfactory for the FLQ-SF. From the results of classical test theory, the FLQ-SF had good acceptance (83 to 100); adequate to very good factor loadings derived from CFA (0.62 to 0.87), acceptable to good corrected item-total correlations (0.54 to 0.82), and good to excellent test-retest reliability (0.75 to 0.93) (Table 2). From the results of Rasch analysis, the FLQ-SF had appropriate infit MnSq (0.77 to 1.28) and outfit MnSq (0.77 to 1.27); had no substantial DIF contrasts (-0.37 to 0.34 across

age group and -0.30 to 0.41 across educational status). Additionally, the Rasch model-generated item difficulties were between -0.74 and 1.21 for WC; -0.73 and 0.57 for DHO; -0.11 and 0.09 for DHL; -0.31 and 0.34 for FP; -0.51 and 0.34 for N (Table 2).

(Insert Table 2 here)

The psychometric properties in the scale-level were satisfactory for the FLQ-SF. From the results of classical test theory, the FLQ-SF had trivial ceiling (2.7% to 8.1%) and floor effects (1.6% to 7.2%), satisfactory internal consistency ( $\alpha = 0.72$  to  $0.91$ ); acceptable fit indices of the CFA (CFI = 0.92, TLI = 0.91, RMSEA = 0.071, and SRMR = 0.050), and excellent test-retest reliability (ICC = 0.77 to 0.88) (Table 3). From the results of Rasch analysis, the FLQ-SF had promising item separation reliability (range between 0.93 and 0.99), excellent item separation index (range between 3.96 and 9.76), acceptable person separation reliability (range between 0.74 and 0.87), and adequate person separation index (range between 2.21 and 2.85) (Table 3).

(Insert Table 3 here)

Additionally, FLQ-SF was adequately associated with external criteria, which support its concurrent validity. More specifically, the FLQ-SF domain scores were positively and significantly correlated to subjective norm ( $r = 0.28$  to  $0.43$ ), PBC ( $r = 0.34$  to  $0.41$ ), behavioral intention ( $r = 0.24$  to  $0.42$ ), fruit consumption ( $r = 0.28$  to  $0.47$ ), vegetable consumption ( $r = 0.23$  to  $0.32$ ), and whole grain consumption ( $r = 0.26$  to  $0.39$ ); negatively and significantly correlated to fast food consumption ( $r = -0.32$  to  $-0.22$ ) (Table 4). The hierarchical regression model further showed that DHO domain (as compared with other FLQ-SF domains) appeared to be a stronger predictor in all types of consumption. Nevertheless, the associations between FLQ-SF domains and the food consumptions were generally supported after controlling relevant confounders (Table 5).

(Insert Tables 4 and 5 here)

## Discussion

To the best of the present authors' knowledge, no prior study has ever examined the psychometric properties of the FLQ-SF since the FLQ was shortened by Sharp et al. [10] Therefore, the present study is the first to have examined the psychometric properties of the FLQ-SF among women with breast cancer. Moreover, the FLQ-SF was translated into Persian version with methodological rigor (i.e., the linguistic validity and cultural adaption were both robust). In comparing the present study with the only other psychometric testing study concerning the FLQ-SF, [10] findings from both studies have a number of agreements: the factorial structure of the FLQ-SF is five-factor, the internal consistency of the FLQ-SF is acceptable, and the concurrent validity of the FLQ-SF is supported by the significant correlations with TPB elements and different types of food consumptions.

Apart from the consistent findings between the present results and the results of Sharp et al., [10] the present study significantly extends the psychometric properties of the FLQ-SF given that the present study found: (i) the FLQ-SF items all fit their embedded domains and only little redundancy exists among these items as the Rasch model indicated that all the FLQ-SF items had acceptable infit and outfit MnSq (i.e., ranged between 0.5 and 1.5); [26,27] (ii) all the FLQ-SF items were interpreted similarly across age group and educational status given that all the DIF contrasts were not substantial (i.e., DIF contrast < 0.5). [29,30] As no substantial DIF was displayed for FLQ-SF items, all the FLQ-SF items can be used to combine or compare women with breast cancer among different age groups or different educational levels; (iii) the FLQ-SF had satisfactory test-retest reliability in both item-level and scale-level. Therefore, the reproducibility of the FLQ-SF is confirmed and healthcare providers can use FLQ-SF across a period of time; (iv) the confirmation of the factorial structure for the FLQ-SF was corroborated by the CFA results. Because Sharp et al. [10] only used exploratory factor analysis (EFA) to determine the FLQ-SF factorial structure, they

recommended that a CFA was needed to verify their EFA structure findings.

The psychometric findings in the present study concerning the FLQ-SF among women with breast cancer may help guide healthcare providers to tackle the important problem of weight gain for women with breast cancer. <sup>[31]</sup> More specifically, because the FLQ-SF is found to be reliable and valid among women with breast cancer, healthcare providers may use the FLQ-SF to understand the food attitudes for these patients and further decide whether programs that improve food attitudes are essential. In other words, using a reliable and valid FLQ-SF will assist healthcare providers in correctly and effectively understanding food attitudes among overweight women with breast cancer.

There are some limitations in the present study. First, the study only recruited women with breast cancer who were overweight or obese. Given that some breast cancer patients may not be overweight, the generalizability of the findings might not be applicable to those who are in other weight status categories (e.g., normal-weight or underweight). Therefore, future studies are needed to examine whether the FLQ-SF is also reliable and valid among women with breast cancer who are not overweight. Second, although the test-retest reliability was examined (which indicated the reproducibility of the FLQ-SF), the responsiveness for the FLQ-SF was not examined. Therefore, it cannot be concluded whether the FLQ-SF can detect meaningful or important changes in food attitudes after the participants completed an effective program on food attitudes improvement. Therefore, future studies are needed to further examine the responsiveness of the FLQ-SF. Third, all the external criteria that were used to assess the concurrent validity of the FLQ-SF (i.e., TPB elements and food consumptions) were self-reported by the participants. Therefore, the common method bias cannot be excluded because FLQ-SF was also self-report. Future studies could use other types of external criteria (e.g., food diary to objectively record food consumption) to eliminate the common method bias. Finally, only women who were overweight or obese were

recruited. Therefore, the findings cannot be generalized to those who are underweight or normal weight. Future studies are required to examine these unstudied populations.

### **Conclusion**

The present study demonstrated that the FLQ-SF serves as a simple measure for assessing food attitudes. The validity, reliability, and feasibility of the FLQ-SF among a sample of breast cancer patients were supported by the rigorous analysis carried out using both classical testing and Rasch analysis.

**REFERENCES**

1. Chan KL, Lee CSC, Cheng CM., Hui LY, So WT, Yu TS, et al. Investigating the relationship between weight-related self-stigma and mental health for overweight/obese children in Hong Kong. *J Nerv Ment Dis* Accepted. doi: 10.1097/NMD.0000000000001021
2. Cheng OY, Yam CLY, Cheung NS, Lee PLP, Ngai MC, Lin C-Y. Extended Theory of Planned Behavior on eating and physical activity. *Am J Health Behav* 2019; 43(3):569-81. doi: 10.5993/AJHB.43.3.11
3. Calle EE, Rodriguez C, Walker-Thurmond K, Thun MJ. Overweight, obesity, and mortality from cancer in a prospectively studied cohort of U.S. adults. *N Engl J Med* 2003;348:1625-38.
4. Ferlay J, Soerjomataram I, Dikshit R, Eser S, Mathers C, Rebelo M, et al. Cancer incidence and mortality worldwide: sources, methods and major patterns in GLOBOCAN 2012. *Int J Cancer* 2015;136(5):E359-86.
5. Nichols HB, Trentham-Dietz A, Egan KM, Titus-Ernstoff L, Holmes MD, Bersch AJ, et al. Body mass index before and after breast cancer diagnosis: associations with all-cause, breast cancer, and cardiovascular disease mortality. *Cancer Epidemiol Biomarkers Prev* 2009;18(5):1403-9.
6. van der Valk ES, van den Akker ELT, Savas M, Kleinendorst L, Visser JA, Van Haelst MM, et al. A comprehensive diagnostic approach to detect underlying causes of obesity in adults. *Obesity Rev* 2019;20(6):795-804. doi: 10.1111/obr.12836
7. Lozano DI, Crites SL, Aikman SN. Changes in food attitudes as a function of hunger. *Appetite* 1999;32:207–18. doi: 10.1006/appe.1998.0205
8. Ajzen I. Nature and operation of attitudes. *Annu Rev Psychol* 2001;52(1):27–58. doi: 10.1146/annurev.psych.52.1.27.

9. Ajzen I. The theory of planned behavior. *Organ Behav Hum Decis Process* 1991;50(2):179-211.
10. Sharp G, Hutchinson AD, Prichard I, Wilson C. Validity and reliability of the Food-Life Questionnaire. Short form. *Appetite* 2013 Nov 1;70:112-8. doi: 10.1016/j.appet.2013.07.001
11. Aikman SN, Crites SLJr, Fabrigar LR. Beyond affect and cognition: Identification of the informational bases of food attitudes. *J Appl Soc Psychol* 2006;36:340–82. doi: 10.1111/j.0021-9029.2006.00011.x
12. Rozin P, Fischler C, Imada S, Sarubin A, Wrzensinewski A. Attitudes to food and the role of food in life in the U.S.A., Japan, Flemish Belgium and France: possible implications for the diet-health debate. *Appetite* 1999;33(2):163-80
13. Rozin P, Bauer R, Catanese D. Food and life, pleasure and worry, among American college student: gender differences and regional similarities. *J Pers Soc Psychol* 2003;85(1):132-41
14. Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine* 2000;25(24):3186-91.
15. Pakpour AH, Zeidi IM, Yekaninejad MS, Burri A. Validation of a translated and culturally adapted Iranian version of the International Index of Erectile Function. *J Sex Marital Ther* 2014;40(6):541-51. doi: 10.1080/0092623X.2013.788110
16. Chitsaz A, Javadi M, Lin C-Y, Pakpour AH. The Predictors of Healthy Eating Behavior among Pregnant Women: An Application of the Theory of Planned Behavior. *Int J Pediatr* 2017;5(10):5897-905.
17. Asghari G, Rezazadeh A, Hosseini-Esfahani F, Mehrabi Y, Mirmiran P, Azizi F. Reliability, comparative validity and stability of dietary patterns derived from an FFQ in the Tehran Lipid and Glucose Study. *Br J Nutr* 2012;108(6):1109–17.

18. Esfahani FH, Asghari G, Mirmiran P, Azizi F. Reproducibility and relative validity of food group intake in a food frequency questionnaire developed for the Tehran Lipid and Glucose Study. *J Epidemiol* 2010;20(2):150–8.
19. Mirmiran P, Esfahani FH, Mehrabi Y, Hedayati M, Azizi F. Reliability and relative validity of an FFQ for nutrients in the Tehran lipid and glucose study. *Public Health Nutr* 2010; 13(5):654–62.
20. Chang C-C, Su J-A, Lin C-Y. Using the Affiliate Stigma Scale with caregivers of people with dementia: Psychometric evaluation. *Alzheimers Res Ther* 2016;8:45. doi:10.1186/s13195-016-0213-y
21. Lin C-Y, Updegraff JA, Pakpour AH. The relationship between the theory of planned behavior and medication adherence in patients with epilepsy. *Epilepsy Behav* 2016;61:231-6. doi:10.1016/j.yebeh.2016.05.030
22. Lin C-Y, Imani V, Cheung P, Pakpour AH. Psychometric testing on two weight stigma instruments in Iran: Weight Self-Stigma Questionnaire and Weight Bias Internalized Scale. *Eat Weight Disord* 2019; epub ahead of print. doi: 10.1007/s40519-019-00699-4.
23. Pakpour AH, Tsai M-C, Lin Y-C, Strong C, Latner JD, Fung XCC, et al. Psychometric properties and measurement invariance of the Weight Self-Stigma Questionnaire and Weight Bias Internalization Scale in Hongkongese children and adolescents. *Int J Clin Health Psychol* 2019;2:150-9. doi: 10.1016/j.ijchp.2019.03.001
24. Su C-T, Yang A-L, Lin C-Y. The construct of the Schizophrenia Quality of Life Scale Revision 4.0 for the population of Taiwan. *Occup Ther Int* 2017;1-11. doi:10.1155/2017/5328101
25. Chang C-C, Su J-A, Chang K-C, Lin C-Y, Koschorke M, Thornicroft G. Perceived stigma of caregivers of people with mental illness: Testing Devaluation of Consumer Families Scale Taiwan version. *Int J Clin Health Psychol* 2018;18(2):170-8. doi:



10.1016/j.ijchp.2017.12.003

26. Lin C-Y, Ganji M, Pontes HM, Imani V, Broström A, Griffiths MD, et al. Psychometric evaluation of the Persian Internet Disorder Scale among adolescents. *J Behav Addict* 2018;7(3):665-75. doi: 10.1556/2006.7.2018.88
27. Chang K-C, Wang J-D, Tang H-P, Cheng C-M, Lin C-Y. Psychometric evaluation, using Rasch analysis, of the WHOQOL-BREF in heroin-dependent people undergoing methadone maintenance treatment: further item validation. *Health Qual Life Outcomes* 2014;12:148. doi:10.1186/s12955-014-0148-6
28. Lin C-Y, Griffiths MD, Pakpour AH. Psychometric evaluation of Persian Nomophobia Questionnaire: Differential item functioning and measurement invariance across gender. *J Behav Addict* 2018;7:100-8.
29. Lin C-Y, Imani V, Broström A, Nilsen P, Fung XCC, Griffiths M, et al. Smartphone application-based addiction among Iranian adolescents: A psychometric study. *Int J Ment Health Addict* 2018; epub ahead of print. doi: 10.1007/s11469-018-0026-2
30. Lin C-Y, Ou H-T, Nikoobakht M, Broström A, Årestedt K, Pakpour AH. Validation of Medication Adherence Report Scale (MARS-5) in older stroke patients in Iran. *J Cardiovasc Nurs* 2018;33(6):536-43. doi: 10.1097/JCN.0000000000000488
31. Picon-Ruiz M, Morata-Tarifa C, Valle-Goffin JJ, Friedman ER, Slingerland JM. Obesity and adverse breast cancer risk and outcome: Mechanistic insights and strategies for intervention. *CA Cancer J Clin* 2017;67(5):378-97. doi: 10.3322/caac.21405