

## Psychometric Characteristics of the Persian Version of Self-Efficacy to Regulate Eating Habits Questionnaire among Female Adolescents

### ABSTRACT

**Background and Objective:** Self-efficacy is an important factor in the acceptance of health behaviors. The positive effects of having healthy eating habits at all ages have been proven. However, poor eating habits are common among adolescents around the world. Understanding self-efficacy can help maintain and improve health-promoting behaviors. The aim of this study was to evaluate the validity and reliability of the self-efficacy questionnaire to regular eating habits among female students aged 15-18 years in Chenaran.

**Materials and Methods:** This cross-sectional research was conducted in the academic year 2016 to 2017. In this study, 439 students in Chenaran were selected using cluster sampling. After translating the questionnaire, using Jones approach, the reliability and validity of the questionnaire were evaluated using Cronbach's alpha, content validity indices, content validity ratio index, and confirmatory factor analysis.

**Results:** The mean age of students participating in the study was  $16.51 \pm 1.04$  and their mean body mass index was  $21.40 \pm 3.64$ . Content Validity Ratio (0.80) and Content Validity Index (0.97) were at an acceptable level for all the questionnaire's items. The level of Cronbach's alpha in the self-Efficacy questionnaire to regulate eating habits questions was 0.924. Confirmatory factor analysis findings showed acceptable fit indices (CFI = 0.892, TLI = 0.879, RMSEA = 0.062,  $d^2/c^2 = 656/978/247 = 2/660$ ).

**Conclusion:** The Persian version of the Self-Efficacy to Regulate Eating Habits is a useful and valuable tool for assessing levels of eating habits. This questionnaire can be used in future research because it shows good factorial validity and adequate reliability.

**Paper Type:** Research Article

**Keywords:** Validity, reliability, Eating habits, Self-efficacy, Iran

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## Introduction

It is well established that diet and nutrition play an important role in maintaining health and preventing disease. During adolescence, young people take responsibility for their eating habits, attitudes, and health behaviors(1). Therefore, determining important and influential factors on eating behaviors and controlling these factors to develop a proper nutritional behavior is important (2). In reviewing the articles, adolescents' eating behaviors are often cited as inappropriate, and it has been shown that unhealthy eating behaviors increase during this stage because they avoid eating more at home. Breakfast and lunch are often the most frequent meals to skip. Of course, social and school activities, parents' jobs, lack of fresh and ready food at home, school away from home, a lot of radio and television commercials advertises about sweet and high-calorie foods, children's reluctance to eat snacks, lack of habit eating snacks in some families, cravings for certain foods can also cause teens to avoid eating snacks in the evening.

Studies conducted in Isfahan also show that 90% of students have poor nutritional performance (3). In fact, the main reason to increase the risk of obesity in adolescents is wrong behaviors related to eating habits (2).

However, obesity and overweight are the main risk factors for the development and spread of chronic diseases (4). It was evidenced that about 70% of adolescents are more likely to remain obese in adulthood. A body mass index greater than 25 kg / m<sup>2</sup> before the age of 20 is considered as the main predictor of obesity and adult health disorders (5). In addition, obesity and overweight are the first risk factors for cardiovascular disease and atherosclerosis. Children and adolescents are highly susceptible to increased insulin resistance and the development of type 2 diabetes, cancer and malignancies, respiratory problems (asthma

and apnea), musculoskeletal disorders (Arthritis causes), and digestive problems. Likewise, obesity and overweight lead to psychological and social problems in adolescents such as low self-esteem, depression, eating disorders, discrimination, and social isolation. In recent years, eating disorder attitudes and behaviors have become increasingly common among young women in a number of countries, which are themselves closely linked to obesity (6). However, health education and health promotion programs could be successful in improving the nutritional status of students when they are planned with proper attention and focus on the most important individual, environmental and social factors affecting students' behaviors (7).

One of the most important predictors of behavior is perceived self-efficacy. Perceived self-efficacy is defined as people's beliefs about their ability to deliver levels of performance that are affected by life events (8). Beliefs related to self-efficacy affect goals, aspirations, and shape the consequences of human behavior. People with more self-efficacy set higher goals and become more committed, and as a result, their behavior becomes more desirable. While people with low self-efficacy, the result of their behavior is not appropriate. Self-efficacy determines how people assess barriers. While people with high self-efficacy remove obstacles by improving self-management skills and perseverance and resist problem (9, 10). Ability to self-control eating is an application of self-efficacy to control weight is defined as; Judging one's ability to cope effectively in situations where the risk of overeating is high (11). Researches has been conducted on measuring the knowledge and attitude of eating habits in early childhood and adulthood (12-14).

Therefore, it is essential to understand the

factors that promote eating habits such as self-efficacy that can prevent unhealthy habits and behaviors in sensitive adolescence. Likewise, considering the importance of health care in Iran, education, mass communication, accurate evaluation of the self-efficacy to regular eating habits is necessary to formulate health promotion and prevention programs. Since, self-efficacy is measured in different dimensions and different ages, no studies have been conducted on the self-efficacy to regular eating habits in Iranian adolescents. This could be related to the lack of appropriate tools to measure it. Therefore, the present study was conducted with the aim of designing and psychometric assessment of a tool to measure the self-efficacy to regular eating habits in Iranian adolescents. Our finding could be used in future programs to educate and improve the living standards of adolescents.

### Materials and Method sampling

This cross-sectional study was conducted from July 2016 to July 2017 on adolescent students in Chenaran city. The random cluster sampling method was used to collect samples. This city was divided into 3 clusters based on the three education districts of Chenaran city (Golbahar, Golmakan, and Chenaran districts) and the district of Chenaran city was randomly selected to collect samples. All female students in high school in this cluster were enrolled. In Chenaran city, five public secondary schools were selected and four classes from each school were considered to enroll eligible students. Finally, twenty students from each class entered in this study.

To assess the sample size, according to the study by Rastegar et al(15), using the formula for comparing the mean of the variables, considering 95% confidence, and an acceptable error of 0.05, approximately 364 people were

estimated. We also the sample size was increased to 439 students for more confidence. Finally, 439 students participated in the research. In total 439 questionnaires were completed.

$$n = \frac{\left(Z_{1-\frac{\alpha}{2}}\right)^2 \left(s^2\right)}{d^2}$$

$$n_1 = \frac{1.96^2 \times s_1^2}{d^2} = \frac{(3.8 \times 4.90^2)}{0.5^2} = \frac{91.23}{0.25} = 364.92 \approx 400$$

### Instruments

The demographic data questionnaire included age, weight, parents' occupation and educational level, regular physical activity and the number of hours spent in front of the TV, computer and cell phone. The main study tool was the SEREHQ<sup>1</sup> which its English version is consisted of 30 items. We measured eating self-efficacy using 30-item eating self-efficacy (ESE) scale that developed by Bandura(16). It has been shown to be a useful measure of exercise beliefs in Korean adults with chronic diseases (17, 18). Bandura's original statement asked participants to rate how certain they could get themselves to perform their exercise routine (16) and it was used for the first time in Iran.

Each item's score is given based on the 5-score Likert scale as 1 to 5 for very high assurance, high assurance, moderate assurance, low, and very low assurance, respectively. The total score ranges from 18 to 90 and it is classified as follows: poor Self- efficacy (30-59), low Self- efficacy (60-89), moderate Self- efficacy (90-119), and high Self- efficacy (120-150).

### Translation of the questionnaire

The translation process was conducted according to the approach used by Jones et al(9, 19-21). In order to standardize the SEREHQ, the questions were initially translated into Persian and any errors were corrected by a native English speaker.

1. Self-Efficacy to Regulate Eating Habits Questionnaire

It was once again translated into English and compared with the original version. Eventually, it was translated into Persian and the final evaluation showed that the main concepts are useful to Farsi-speaking adolescents. The questionnaire was then given to 15 experts in public health, health education, biostatistics, nutrition, physical education, and educational management to check its content validity. It was then delivered as a pilot to several female students in the 15-18 years age group and the ambiguities in the questions were identified.

#### **Validation: Face and content validities**

Prior to the study, necessary changes were made in the type of questions and matching options; then, to determine the validity of the content, this questionnaire was sent to 15 professors including 5 nutritionists, 4 health education specialists, and 6 educational management specialists.

To evaluate content validity quantitatively, relative Content Validity Ratio (CVR) and Content Validity Index (CVI) were used. In order to determine CVI, the opinion of experts was determined according to the objectives of the research, regarding the relevance of the questions.

Also, the criteria of simplicity and the appropriateness of the clarity of the questions were determined. To determine the validity of the content, experts' opinions on the tool questions were measured based on the three criteria of simplicity and fluency, relevance or specificity, clarity BASED ON a 4-point Likert score for each question. According to the Lawshe table, if CVI is above 79% and CVR is above 49%, it is considered appropriate(22, 23). In the present study, the CVR of the questionnaire was 0.80 and the CVI of this questionnaire was 0.97.

#### **Construct validity assessment (Confirmatory factor analysis)**

A confirmatory factor analysis (CFA) was used to

investigate the goodness of fit in the measurement model. The original model consisting of thirty questions, in the second model, items with low factor loadings ( $< .40$ ) were eliminated. In order to improve model fit, items which had low factor loadings ( $< .40$ ) were also eliminated after these modifications. The final model consisted of 24 questions. The maximum likelihood estimation method was used. Several measures were used to evaluate fit of the model including  $\chi^2$  divided by degrees of freedom ( $\chi^2/df$ ), comparative fit index (CFI), Tucker-Lewis index (TLI), and root mean squared error of approximation (RMSEA). Cutoff scores used were:  $\chi^2/df \leq 5$ ,  $CFI \geq .90$ ,  $TLI \geq .90$ , and  $RMSEA \leq .06$  to  $.08(24)$ . Each question in the Eating Habits Self-Efficacy Questionnaire had five options: a (very low confident), b (slightly confident), c (moderately confident), d (very confident), and e (very much confident). Options from 1 to 5 were scored. The ranking was based on the number of questions in the regular physical activity self-efficacy questionnaire between 30 and 150.

#### **Internal validity**

In order to approve the structure's validity, confirmatory factor analyses were used. A factor load  $>0.4$  is significant and it was approved (25). The significance level for results' interpretation was considered as  $P < 0.05$ .

#### **Reliability**

Cronbach's alpha coefficient was used to determine the reliability of the questionnaire. calculated for self-efficacy it was 0.924 in this study. Also, face reliability was determined by completing a questionnaire by 10 female students aged from 15 to 18 in Chenaran within 10 days from the start of the study.

#### **Ethical Considerations (inclusion and exclusion criteria)**

The inclusion criteria were as follows: 15 to 18-year-old girls in high school who were

a resident of Chenaran city, had given an informed consent, had no physiological or other underlying disease. All students who did not fill the questionnaire correctly or experienced an illness interfering with the study protocol were excluded from the study. Participation in this study was entirely voluntary and the questionnaires were anonymous. All collected data were confidential. A participation gift was also given to the participants. The code of research ethics is IR.MUMS.REC.1395.623.

### Data analyses

After entering the data into SPSS software version 24, absolute and relative frequency, mean and standard deviation were used to describe the data. Internal consistency assessment between questionnaire questions was calculated using Cronbach's alpha. To analyze the data of the descriptive study, after collecting the information related to the research units in coded form, it was entered into SPSS software version 24 and after carefully examining and ensuring the accuracy of the data using descriptive statistics, indices of tendency to center and dispersion and values related to quantitative variables and determining the frequency distribution and percentage related to qualitative variables were determined. Then, to determine the distribution of variables, Kolmogorov-Smirnov test was used and based on the results, appropriate parametric tests for normal variables and non-parametric tests for abnormal variables were used. Confirmatory factor analysis method was used to determine the validity of the structure using Amos software. Confirmatory factor analysis findings showed acceptable fit indices (CFI = 0.892, TLI = 0.879, RMSEA = 0.062,  $d\chi^2/c2 = 656/978/247 = 2/660$ ).

### Results

The students' mean (SD) age was  $16.51 \pm 1.04$

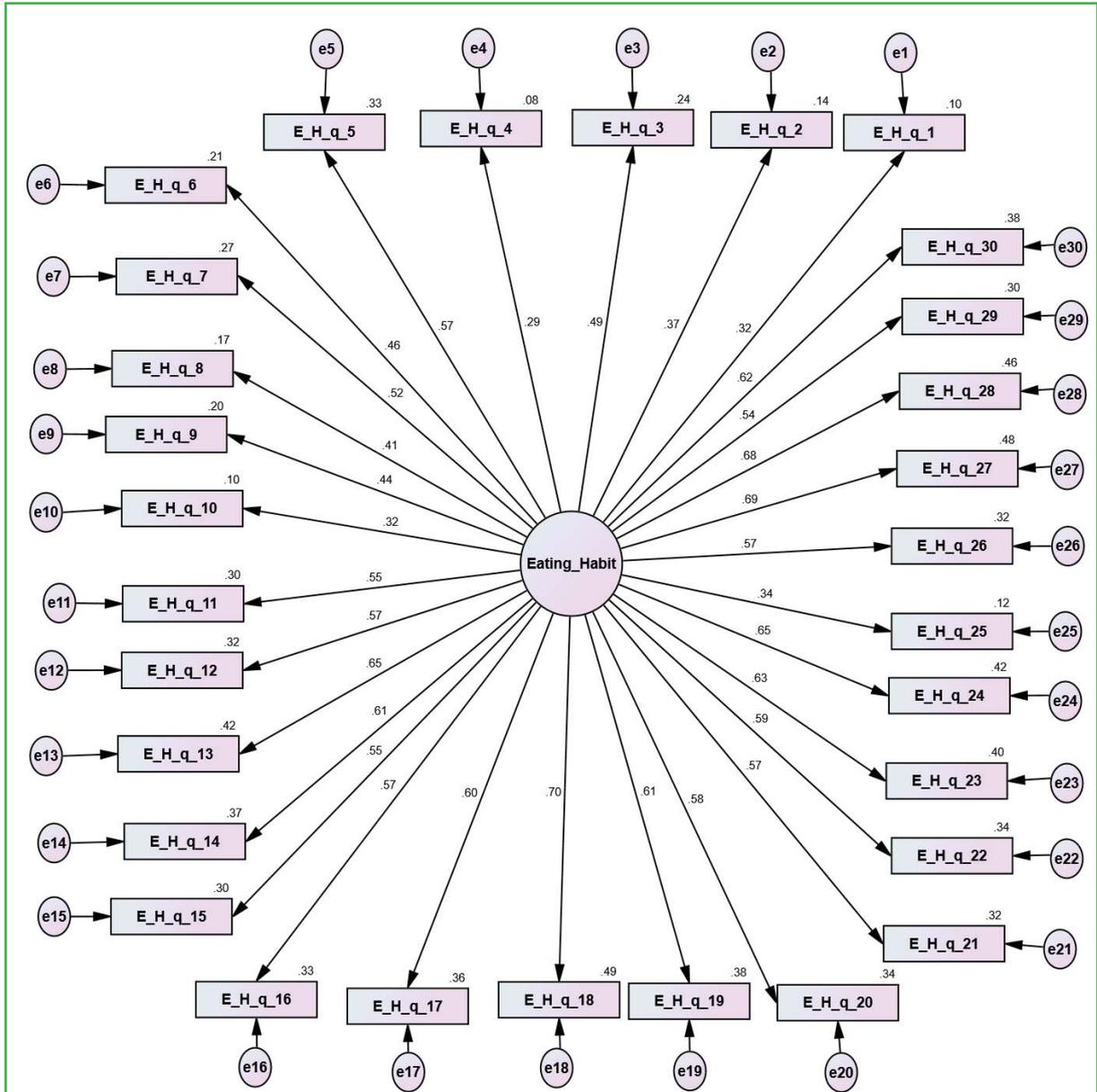
years and the mean (SD) BMI was  $21.40 \pm 3.64$ . The demographic characteristics of the studied population are summarized in Table 1. The mean(SD) self-efficacy for eating habits score was  $84.25 \pm 22.07$ ; it was poor in 21.2% of participants ( $n=93$ ), low in 51.3% ( $n=233$ ), moderate in 21.1% ( $n=93$ ), and high in 4.6% ( $n=20$ ). The response rate of the questionnaire was 2.5. The results showed that the self-efficacy to regular eating habits questionnaire is a valid and reliable tool. Cronbach's alpha coefficient was calculated to be 0.924. CVR of the self-efficacy to regular eating habits questionnaire was 0.80 and the CVI of this questionnaire was 0.97. The level of Cronbach's alpha among the Self-Efficacy to Regulate Eating Habits Questionnaire questions was 0.924.

**Table 1. Demographic characteristics of the studied population**

Variable		No. (%)
Father's occupation	Self-employed	395 (90.0)
	Government- employee	44 (10.0)
Father's education	Illiterate to elementary school	145 (33.0)
	Guidance school to diploma	247 (56.3)
	Over diploma	47 (10.7)
Mother's occupation	Housewife	389 (88.6)
	Employed	50 (11.4)
Mother's education	Illiterate to elementary school	199 (45.3)
	Guidance school to diploma	210 (47.8)
	Over diploma	30 (6.8)
Regular physical activity	Yes	104 (23.7)
	No	335 (76.3)
TV watching and work on a computer	$\geq 2$ hrs	391 (89.1)
	$<2$ hrs	48 (10.9)
Body mass index	Underweight	28 (6.6)
	Normal	263 (59.9)
	Overweight	125 (28.3)
	Obese	23 (5.2)

**Table 2. Goodness of fit indices before adjustment (Initial model (before modification))**

$\chi^2/DF$	TLI	AGFI	CFI	RMSEA
1416.405=3.497	0.760	0.761	0.777	0.077



**Figure 1. Results of confirmatory factor analysis before corrections**

**Table 3. Goodness of fit indices after initial modification of the model**

$\chi^2/DF$	TLI	AGFI	CFI	RMSEA
973.418.392=2.483	0.858	0.832	0.872	0.059

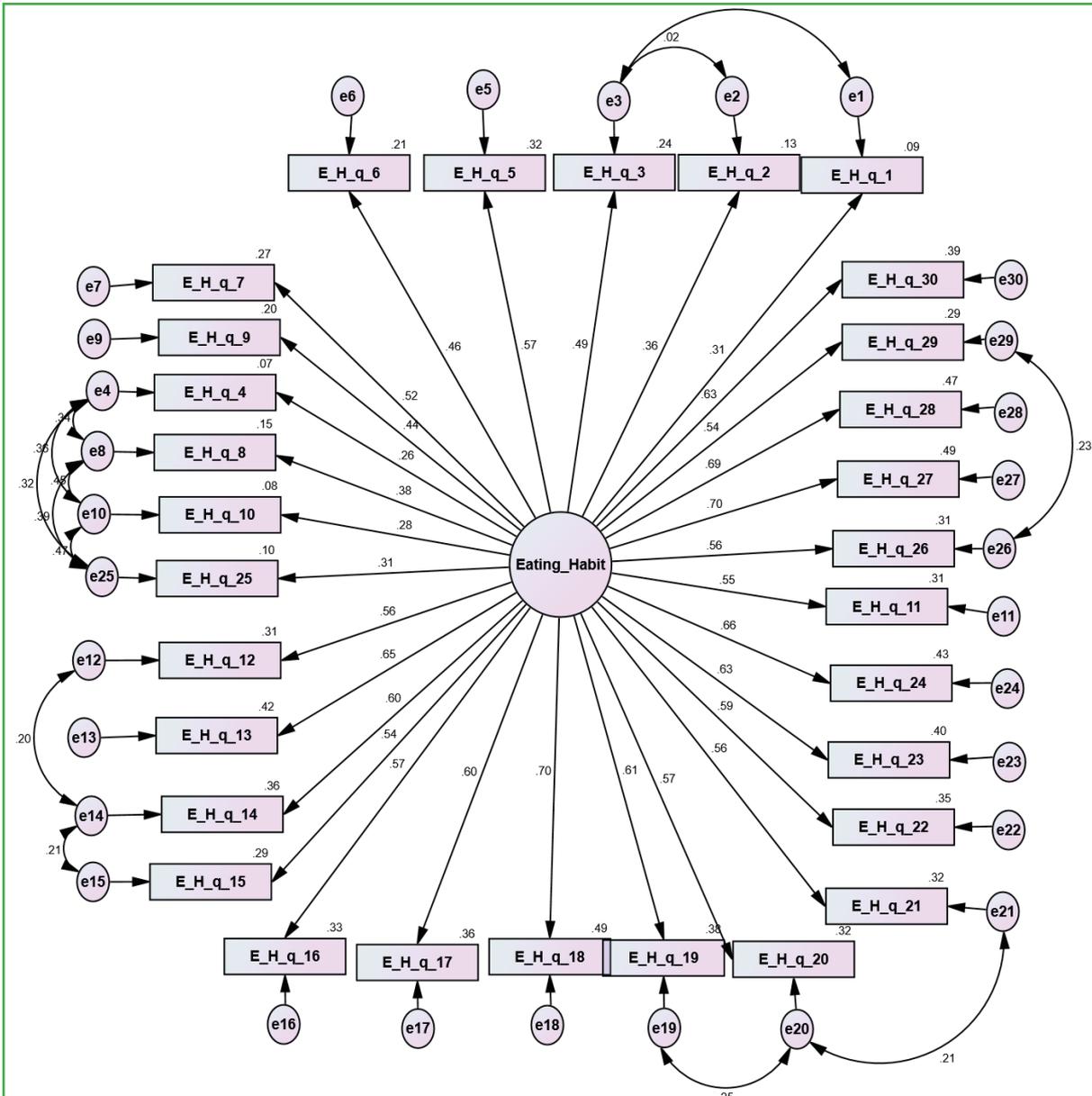


Figure 2. Results of confirmatory factor analysis after corrections

Final modified model (after calculating correlations and removing loads less than 0.4) The indicators are almost acceptable. Six questions

were removed from the original version of the questionnaire.

Table 4. Goodness of fit indices after final modification of the model

$\chi^2/DF$	TLI	AGFI	CFI	RMSEA
656.978.247=2.66	0.879	0.859	0.892	0.062

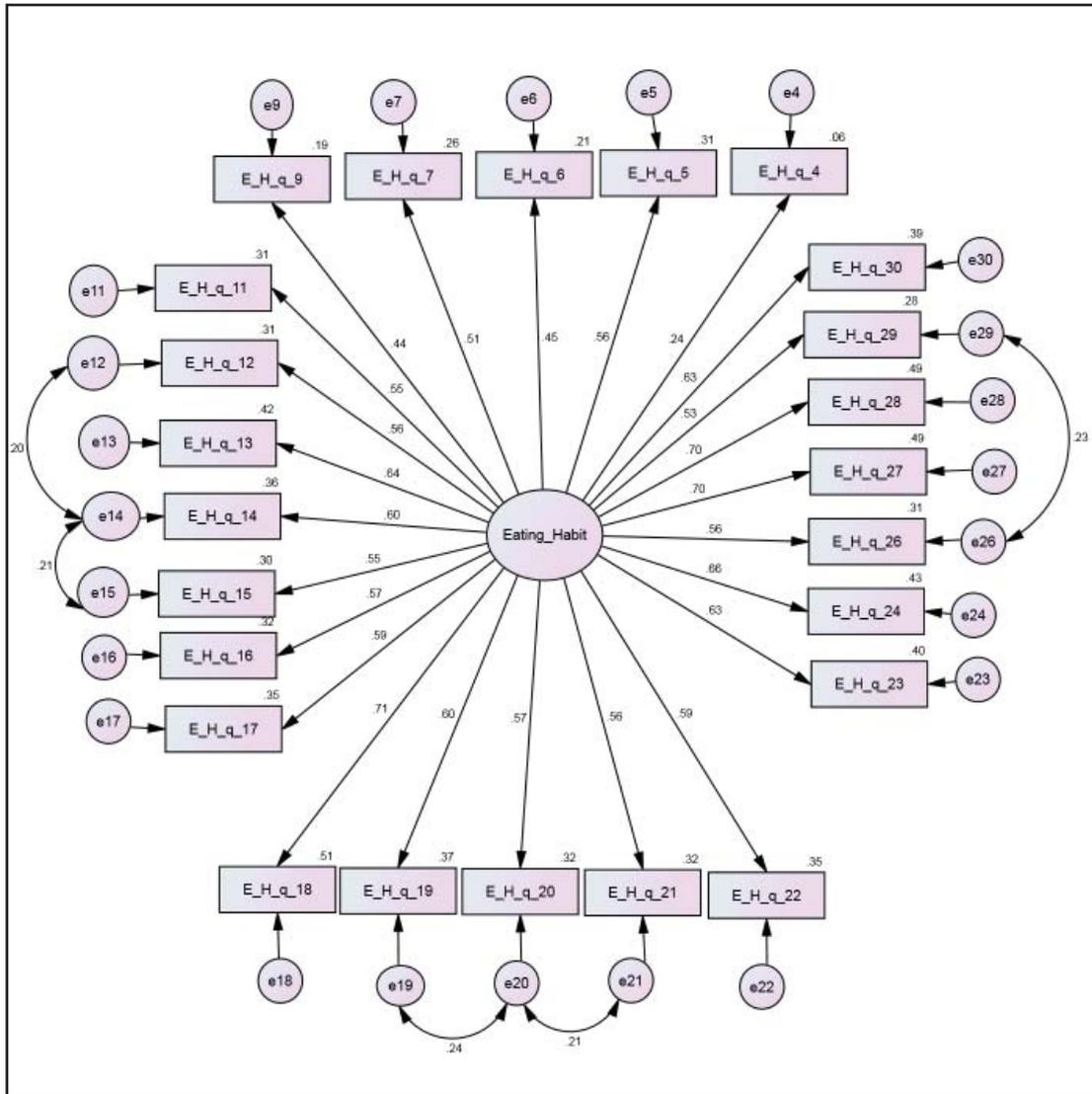


Figure 3. Results of confirmatory factor analysis after final corrections

Table 5. The final version of the questionnaire after the final corrections and removal of questions with a factor load of less than 0.04

question number	English version and Persian translation of Self-Efficacy to Regulate Eating Habits questionnaire		Factor load
1	While watching television	I'm sure I can eat a healthy diet while watching TV	0.486
2	Feeling restless or bored	I'm sure I able to have a proper diet when I feel tired	0.359
3	During holiday times	I'm sure that I can have proper diet on the weekends (Thursdays and Fridays)	0.308
4	Feeling upset or tense over job-related matters	I am sure that I can have a proper diet when I feel upset or tense about my academic issues	0.256
5	Eating at a friend's house for dinner	I'm sure that I can have proper diet when I'm at a friend 's house for dinner	0.569
6	Preparing meals for others	I'm sure that I can have proper diet when I prepare meals for others (breakfast, lunch, and dinner).	0.443
7	Eating at a restaurant alone	I'm sure that I can have a proper diet when I go to restaurants alone	0.284

8	When angry or annoyed	I'm sure that I can have a proper diet when I'm angry or upset	0.554
9	When very hungry	I'm sure that I can have a proper diet when I'm very hungry	0.557
10	When depressed	I'm sure that I can have a proper diet when I'm depressed.	0.646
11	When you want to sit back and enjoy food	I am sure that I can have a proper diet when I sit quietly and want to enjoy eating.	0.6
12	When lots of high fat food is available in the house	I am sure that I can have a proper diet when there are plenty of high-fat foods available at home.	0.539
13	Feel like celebrating with others	I am sure that I can have a proper diet when I'm in party with others and want to have fun.	0.573
14	Someone offers you high fat foods	I am sure that I can have a proper diet when someone offers me high-fat foods	0.598
15	Feel a strong urge to eat foods high in fat that you like	I'm sure I can have a proper diet when I have a strong desire to eat the high-fat foods that I like	0.703
16	When you are entertaining visitors	I'm sure I can have a proper diet when I'm a host	0.613
17	During vacations	I am sure that I can have a proper diet when I am on a long vacation (summer, Nowruz, etc.)	0.569
18	Eating out with others when they are ordering high fat meals	I'm sure I can have a proper diet when I eat with others and they order high-fat meals.	0.565
19	Parties where a lot of appetizing high fat food is served	I am sure that I can have a proper diet at parties where I face eat appetizing and fatty foods (pizza, dumplings, sausage sandwiches and hamburgers ...)	0.588
20	At recreational and sport events where high fat fast foods are served	I am sure that I can have a proper diet during leisure and sports activities where fatty food and fast foods (chips, puffs, pizza, dumplings, sausage sandwiches and burgare) are served.	0.634
21	When visiting a city and needing a quick meal	I am sure that I can have a proper diet when I visit a city and need a quick meal	0.657
22	Airplane meals with high fat items	I'm sure I can have a proper diet when I am on a plane and train with high - fat meals.	0.311
23	When visiting a city and wanting to experience the local food and restaurants	I'm sure I can have a proper diet when I'm traveling and want to experience food at local restaurants.	0.56
24	Holidays and celebrations where high fat foods are served	I am sure that I can have a proper diet during holidays and celebrations (family parties, birthday parties, feasts, votive meals, religious occasions such as Muharram and Safar, etc.) where high-fat foods are served.	0.701
25	When upset over family matters	I'm sure I can have a proper diet when I'm upset about family problems	0.689
26	When you want some variety in your diet	I'm sure I can have a proper diet when I want to have variety in my diet	0.536
27	When eating breakfast in a restaurant	I'm sure I can have a proper diet when I want to eat in a restaurant	0.626
28	Others bring or serve high fat foods	I'm sure I can have a proper diet when others bring or order high-fat foods.	0.46
29	When you have to prepare your own meals	I am sure that I can have a proper diet when I have to prepare food for myself	0.523
30	When faced with appealing high fat foods in the supermarket	I am sure that I can have a proper diet when I face with delicious and attractive fatty foods in the supermarket.	0.381

The model goodness of fit index (GFI) indicated lack of model's fit before the adjustment. After adjustment (Fig 2 and 3) the validity of the SEREHQ was approved.

From the total of fit statistics, 5 fit indices included root mean square error of approximation (Adjusted goodness of fit index, Goodness of Fit Index), Tucker index Lewis (Tucker-Lewis index) and  $\chi^2$  were measured in this model. The non-significance of chi-square is an indication of the value, because the confirmation of the null hypothesis was considered. The closer the two AGFI and GFI indices are to each other, the more they show the full fit of the model, and the low of the RMSEA = 0.06 index indicates the suitability of the model (Table 4). The value that close to zero is more desirable and the values less than 0.1 are good indicators of fit. From the sum of the fit indicators, it can be seen that the data are in complete agreement with the assumed model and the conceptual model (Figure3) is verifiable. In other words, the data were strong enough to validate the regular physical activity self-efficacy questionnaire using confirmatory factor analysis.

## Discussion

The aim of the present study was to assess the validity and reliability of the questionnaire for evaluating self-efficacy to regular eating habits among adolescents in Iran. It was the first attempt on the localization (indigenization) of this tool, and regarding the number of questions on the different aspects of eating habits self-efficiency, It is different from the original version. Questions with a factor loading of less than 0.4 were removed from the questionnaire and questions with a factor loading between 0.4 and 0.7 were corrected. The final modified model (after correlating correlations and removing loads less than 0.4) shows that the indicators are almost acceptable. Six, questions were removed

from the original version of the questionnaire. In confirmatory factor analysis, in addition to calculating the factor load, the significance of the factor load is also evaluated and tested. Cronbach's alpha reliability coefficient was used to evaluate the reliability of the scale. The value of Cronbach's reliability coefficient is within the acceptable range.

Based on the results of confirmatory factor analysis, the standard factor load value of 24 questions with a factor load higher than 0.4 was obtained. The second, third, fourth, seventh, twenty-second, and thirtieth questions with factor loads of 0.35, 0.30, 0.25, 0.28, 0.31 and 0.38 were removed from the original questionnaire, respectively.

The results obtained can not be compared with any other study, because the validity and reliability of the questionnaire was conducted for the first time in Iran and the world.

In the present study, the questionnaire was carefully administered by fluent and knowledgeable individuals, following the principles of translation and paying attention to its correct process and accuracy in cultural adaptation of meanings. One of the strengths of this research is the observance of the main steps recommended according to reliable sources for the translation process and ensuring the cultural conformity of the scale. The results of this study showed that the Cronbach's alpha value between the questions of the regular eating habits self-efficacy questionnaire was 0.924 and all the goodness indicators of the model fit in the confirmatory factor analysis at an acceptable level. The studied cases lived in a small district and mostly had a sedentary life style due to cultural restrictions.

Moreover, the findings of the current study showed that self-efficacy of regular eating habits is low among 15 to 18-year-old girls in

Chenaran. Students with an abnormal BMI (thin, overweight, and obese) have a high percentage. One main reason is the unfamiliarity of the students, their parents and teachers with the concept and strategies of self-efficiency. Moreover, lack of time, lack of social support, laziness, indifference, not believing in physical activity and low self-efficiency, lack of suitable sports facilities and sites and being busy with education and work were the most common obstacles in such cases. In general, the results of the current study showed that eating habit self-efficiency is low among the adolescents in Chenaran while a sedentary life style is alarmingly common. With understanding of the strategies of self-efficiency we can take effective steps towards the establishment of healthy behaviors in adolescents. Health habits and patterns are mostly formed in adolescence and thus correct health behaviors in such ages affect health and wellbeing in the coming years; and as schools have a major role in transmitting healthy or unhealthy habits, therefore the necessity of providing educational programs based on self-efficiency patterns aimed at changing health habits and patterns is highly essential.

This study similar to many others had certain limitations. Completing the questionnaire by students was done during their final school exams which might have affected their responses. On the other hand, only 15 to 18-year-old female students from governmental urban schools completed the questionnaire. It is recommended that a similar study is conducted on nongovernmental and rural schools, those in the 10-14-year age group, on male students and high-risk groups. Unfortunately, one of the main limitations was the unavailability of a similar study in adolescents which restricted possible comparisons. It highlights the necessity for further studies in this respect. Furthermore, students with overweight or obesity and those

with a lower socio-economic status were not willing to fill the questionnaire due to their inappropriate physical condition whom were eventually encouraged and convinced by the researcher, yet highly time-consuming. Finally, other aspects of validity, such as convergent and divergent validity, need to be explored for the Iranian version.

In order to use this questionnaire in future studies, assessment of its validity and reliability is recommended to be done according to the population characteristics.

The eating habit self-efficacy scale used in this study is a reliable and valid measure, and appropriate for use in an Iranian female student population of 15-18 years old. Further testing of this scale with other populations will be needed in assessing not only external validity for different populations, but also the predictive utility of the scale to assess the capacity and initiate the regular eating habits forever.

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## References

1. Turconi G, Guarcello M, Maccarini L, Cignoli F, Setti S, Bazzano R, et al. Eating habits and behaviors, physical activity, nutritional and food safety knowledge and beliefs in an adolescent Italian population. *Journal of*

- the American College of Nutrition. 2008;27(1):31-43. <https://doi.org/10.1080/07315724.2008.10719672>
2. Ramezani A. The theory based on psychological and socioenvironmental factors associated with eating behaviors and obesity in adolescents. *Clinical Excellence*. 2015;4(1):32-17.
  3. Vahedian-Shahroodi M, Tehrani H, Robat-Sarpooshi D, GHolian-Aval M, Jafari A, Alizadeh-Siuki H. The impact of health education on nutritional behaviors in female students: An application of health belief model. *International Journal of Health Promotion and Education*. 2021;59(2):70-82. <https://doi.org/10.1080/14635240.2019.1696219>
  4. Patel S, Ram F, Patel SK, Kumar K. Association of behavioral risk factors with self-reported and symptom or measured chronic diseases among adult population (18-69 years) in India: evidence from SAGE study. *BMC public health*. 2019;19(1):1-17. <https://doi.org/10.1186/s12889-019-6953-4>
  5. Keikha F, Ansari H, khosravi M, Seraji M. The Effect of Educational Intervention on Health Literacy and Nutritional Performance of Female High School Students in Zahedan. *Journal of Health Literacy*. 2021;6(1):41-50.
  6. Chiarelli F, Marcovecchio ML. Insulin resistance and obesity in childhood. *European Journal of Endocrinology*. 2008;159(suppl\_1):S67-S74. <https://doi.org/10.1530/EJE-08-0245>
  7. Tavassoli E, Ramezankhani A, Mirmiran P, Mehrabi Y, Hafez AA. Knowledge and perceptions of obesity prevention and consumption of fruits and vegetables among high school girl students in shahr-e-kord. *Journal of Advances in Medicine and Medical Research*. 2015:200-11. <https://doi.org/10.9734/BJMMR/2015/12716>
  8. Hsiao H-C, Chang J-C, Tu Y-L, Chen S-C. The impact of self-efficacy on innovative work behavior for teachers. *International Journal of Social Science and Humanity*. 2011;1(1):31. <https://doi.org/10.7763/IJSSH.2011.V1.6>
  9. Motamedi M, Peyman N, Jamali J, Afzalaghaee M. Psychometric Characteristics of The Persian Version of The Self-Efficacy to Regulate Exercise Questionnaire Among Female Adolescents. *Journal of Health Literacy*. 2020;5(2):38-45.
  10. Aghdasi Z, Tehrani H, Esmaily H, Ghavami M, Vahedian-Shahroodi M. Application of social cognitive theory on maternal nutritional behavior for weight of children 6 to 12 months with Failure to thrive (FTT). *Iranian Journal of Health Education and Health Promotion*. 2021;9(2):145-58. <https://doi.org/10.52547/ijhehp.9.2.145>
  11. Pearson N, Biddle SJ, Williams L, Worsley A, Crawford D, Ball K. Adolescent television viewing and unhealthy snack food consumption: the mediating role of home availability of unhealthy snack foods. *Public health nutrition*. 2014;17(2):317-23. <https://doi.org/10.1017/S1368980012005204>
  12. Trakman GL, Forsyth A, Hoye R, Belski R. Developing and validating a nutrition knowledge questionnaire: key methods and considerations. *Public health nutrition*. 2017;20(15):2670-9. <https://doi.org/10.1017/S1368980017001471>
  13. Kwon KM, Shim JE, Kang M, Paik H-Y. Association between picky eating behaviors and nutritional status in early childhood: Performance of a picky eating behavior questionnaire. *Nutrients*. 2017;9(5):463. <https://doi.org/10.3390/nu9050463>
  14. Krause CG, Beer-Borst S, Sommerhalder K, Hayoz S, Abel T. A short food literacy questionnaire (SFLQ) for adults: Findings from a Swiss validation study. *Appetite*. 2018;120:275-80. <https://doi.org/10.1016/j.appet.2017.08.039>
  15. Peyman N, Ezzati Rastegar K, Taghipour A, Esmaily H. Effect of Education on the Weight Self-Efficacy lifestyle among Adolescent Girls with Overweight and Obesity. *Armaghane danesh*. 2012;17(2):117-28.
  16. Bandura A. Guide for constructing self-efficacy scales. *Self-efficacy beliefs of adolescents*. 2006;5(1):307-37.
  17. Shin Y, Jang H, Pender NJ. Psychometric evaluation of the exercise self-efficacy scale among Korean adults with chronic diseases. *Research in Nursing & Health*. 2001;24(1):68-76. [https://doi.org/10.1002/1098-240X\(200102\)24:1<68::AID-NUR1008>3.0.CO;2-C](https://doi.org/10.1002/1098-240X(200102)24:1<68::AID-NUR1008>3.0.CO;2-C)
  18. Shin YH, Hur HK, Pender NJ, Jang HJ, Kim M-S. Exercise self-efficacy, exercise benefits and barriers, and commitment to a plan for exercise among Korean women with osteoporosis and osteoarthritis. *International Journal of Nursing Studies*. 2006;43(1):3-10. <https://doi.org/10.1016/j.ijnurstu.2004.10.008>
  19. Kazemi AF, Hajian S, Sharifi N. The Psychometric Properties of the Persian Version of the Pregnancy Physical Activity Questionnaire. *International Journal of Women's Health and Reproduction Sciences*. 2019;7(1):54-60. <https://doi.org/10.15296/ijwhr.2019.09>
  20. Mohammadi Zeidi I, Pakpour Hajiagha A, Mohammadi Zeidi B. Reliability and validity of Persian version of the health-promoting lifestyle profile. *Journal of Mazandaran University of Medical Sciences*. 2012;21(1):102-13.
  21. Jones EG, Mallinson RK, Phillips L, Kang Y. Challenges in language, culture, and modality: translating English measures into American Sign Language. *Nursing Research*. 2006;55(2):75-81. <https://doi.org/10.1097/00006199-200603000-00002>
  22. Lawshe CH. A quantitative approach to content validity. *Personnel psychology*. 1975;28(4):563-75. <https://doi.org/10.1111/j.1744-6570.1975.tb01393.x>
  23. Lawshe C. A quantitative approach to content validity, *Personal Psychology*, 28 (4), 563-575. 1975. <https://doi.org/10.1111/j.1744-6570.1975.tb01393.x>
  24. Dymecka J, Bidzan-Bluma I, Bidzan M, Borucka-Kotwica A, Atroszko P, Bidzan M. Validity and reliability of the Polish adaptation of the Health-Related Hardiness Scale-the first confirmatory factor analysis results for a commonly used scale. *Health Psychology Report*. 2020;8(3):248-62-62. <https://doi.org/10.5114/hpr.2020.95746>
  25. Kharazi SS, Peyman N, Esmaily H. An Evaluation of the Validity and Reliability of the Maternal Health Literacy and Pregnancy Outcome Questionnaire. *Journal of Health System Research*. 2017;12(4):512-9.