Families' Health Behavior: Validity and Reliability of the Turkish Version of the Family Health Climate Scale

Esra Güney, Esra Karataş Okyay & Tuba Uçar

Routledge
Taylor & Francis Group

Check for updates

Families' Health Behavior: Validity and Reliability of the Turkish Version of the Family Health Climate Scale

Esra Güney (iD), Esra Karataş Okyay (iD), and Tuba Uçar (iD)

Faculty of Health Sciences, Department of Midwifery, İnönü University, Malatya, Turkey

ABSTRACT

This study aims to adapting the Family Health Climate Scale (FHC Scale) into Turkish and to conduct its validity and reliability analyses. The FHC Scale consists of two subscales, the Physical Activity Scale (FHC-PA) and the Nutrition Scale (FHC-NU). The validity and reliability analyzes of the scales were done separately. The sample included 789 participants (263 students, 263 mothers, 263 fathers). The sample was randomly allocated to two groups. Explanatory Factor Analysis (EFA) was performed on Sample I (132 students, 132 mothers, 132 fathers); and Confirmatory Factor Analysis (CFA) on sample II (131 students, 131 mothers, 131 fathers). As a result of the EFA it was determined that three factors FHC-PA Scale; and four factors FHC-NU Scale were included. The CFA result it was determined that scale models had good fit values. The FHC-Scale could be used as a reliable and valid measurement tool in Turkey.

Introduction

Willpower together with cognitive and emotional motivation determine whether an individual will choose to exercise or remain sedentary in her/his spare time; these factors will also determine whether the food s/he consumes each day is healthy or unhealthy. According to Bandura's social cognitive theory, this behavior can only be explained by considering the interaction of personal, behavioral, and environmental factors (Bandura, 1986). It has been claimed that the mutual interactions of family members shape an individual's activity and nutritional behavior, and this approach is based on the concept of a "climate." In this context, one's climate consists of the collectively shared ideas, attitudes, emotions, and behaviors that characterize life in a social environment (Ekvall, 1996). A climate can be thought of as a special social environment as opposed to the individual environment created by individual members. Assuming that a climate functions as a determinant of health behavior provides an opportunity to closely examine the climate's structure (Patterson et al., 2005). The definition of the term "climate" in terms of the environmental dimension of the family means that shapes the individual health behavior, the term climate is seen as a specific attribute of the family judged by the individual. Therefore, the term "family health climate" has been used (Niermann, Krapf, Renner, Reiner, & Woll, 2014).

A family health climate refers to the sharing of experiences, expectations, and concerns about health and healthy behavior. The family health climate also acts as a framework for the formation of the daily health behavior of the individual and constitutes the basis for evaluating and, if needed, regulating own behavior and that of others (Johnson, Van Jaarsveld, & Wardle, 2011). Therefore, the family health climate is an important aspect of the family environment that shapes the daily health

---

behaviors of family members both within and outside the family. When evaluating the family health climate, the shared cognitions and perceptions of a healthy lifestyle within the family must be considered. In a positive family health climate, both being physically active and eating healthily are very important and integral parts of the family's daily life. A positive family health climate is also associated with family members supporting each other at joint family meals and participating together in physical activities (Niermann et al., 2014).

It is important that the whole family cares about being physically active in their spare time, and spends time together in physical activities. The fact that family members accept this situation as a part of their daily life is considered to be an indicator that they care about physical activity. In this respect, when the family takes part in sporty activities such as bicycling, walking, going to the swimming pool, it gives information about the physical activity processes of family members (Niermann et al., 2014). As a matter of fact, it was reported in previous studies that there is a strong relationship between physical activity and family institution, and especially the participation of parents and some elements such as the aims and expectations of making physical activity are reflected in the children. In this respect, the relations of children of families doing physical activity with physical activity are also formed in this framework (Yüksel, 2019). The fact that children of physically active mothers develop behaviors in the same way; and similarly, children of families who have sedentary lifestyles also have the same lifestyle as their parents also reveal the importance of family climate (Niermann, Spengler, & Gubbels, 2018). It also allows family members to develop healthy behaviors in terms of physical activity when all family follow and search current information, share the information with family members, and activate common decision-making mechanism when planning and performing these activities enable family members to develop healthy behaviors (Niermann et al., 2014).

In the family health climate, when all family pays attention to healthy nutrition and give importance to the healthy nutrient selection, it shows that the family cares about nutrition. In families who have strong communication in terms of nutrition, it is easier to follow up-to-date information, share information about healthy-unhealthy nutrients and develop common behaviors. When parents who care about nutrition and eating together become a model for other family members and thus develop common behaviors (Niermann et al., 2014). The fact that the risk of being overweight and unhealthy and irregular nutrition decreases in children and adolescents who eat with their families three or more times a week, but the increase in healthy nutrients proves this (Hammons & Fiese, 2011). Creating the opportunity to eat together, to enjoy this situation, and make it a part of the daily routine are evaluated as an indicator of commitment between family members. It will also provide us with an idea on the settlement situations between the members to fall into disagreement or agree about any food (Niermann et al., 2014). Consuming more fruit-vegetable and less sugar and beverages in the house with family than in other social environments is the evidence for this (Hammons & Fiese, 2011).

It is very important to determine whether the individual, the family, or society at large have developed healthy eating behaviors and are physically active. Incomplete or inaccurate information on attitudes and behaviors for developing the healthy behaviors of the individuals in the family health climate should be identified; consequently, the necessary steps to improve these aspects should be determined and encouraged. Currently, there is no measurement tool in Turkey that allows for determination of the family health climate and evaluates family members' health behaviors and processes of engaging in exercise. This study aimed to adapt the Family Health Climate Scale (FHC-scale), which was developed by Niermann et al. in 2014, into the Turkish language and conduct validity and reliability analyses to determine its applicability.

Materials and methods

Type of research and sample

The research was methodological in style and was carried out in an eastern province in Turkey. The research data were collected from students and their parents (N = 2882) at four different high schools providing formal education between January 2020 and March 2020. The sample sizes for a reliable factor

analysis of the adaptation of a scale to a different culture have been classified as follows: 100 = "poor," 200 = "medium," 300 = "good," and 500 = "very good" (Kline, 1994). It was planned to include 500 participants in the sampling in the present study (500 students, 500 mothers, 500 fathers). The number of students to be taken from schools was determined by proportioning the weight of schools in the population. A total of 161 (n = 930) students from A high school, 104 (n = 600) from B high school, 112 (n = 640) from C high school, and 123 (n = 712) from D high school were included in the sampling with the Stratified Sampling Method. After the students were listed and numbered with the Simple Random Sampling Method, the sampling was selected by using the random numbers table. Exclusion criteria were those who did not meet the research criteria (any students or parents with a health problem, or those living separately from their parents) or the submission of incomplete questionnaires. The questionnaires of 237 participants were deemed invalid and excluded from evaluation. Thus, the final sample of the study consisted of 789 participants (263 students, 263 mothers, and 263 fathers). Fabrigar, Wegener, MacCallum, and Strahan (1999) suggest a random division of the sample into two parts if it is large enough and applying EFA to one and CFA to the other. When the adequate sample size is ensured, each analysis can be conducted on different samples randomly selected from the same population. Accordingly, in this study, the sample was randomly divided into two and Exploratory Factor Analysis (EFA) was applied to Sample I and Confirmatory Factor Analysis (CFA) was applied to Sample II. Individuals were randomly selected from the sample to form Sample I (396 participants = 132 students, 132 mothers, and 132 fathers), and the remaining individuals constituted Sample II (393 participants = 131 students, 131 mothers, and 131 fathers).

Data collection tools

Personal information form

The personal information form created by the researchers through the literature review was prepared separately for the students, mothers, and fathers (Gerards Sanne, Niermann, Gevers Dorus, Eussen, & Kremers Stef, 2016; Lima-Rodríguez, Lima-Serrano, Jiménez-Picón, & Domínguez-Sánchez, 2013; Niermann et al., 2014). Seven questions determined socio-demographic characteristics on the student form, including age, grade, height, and weight. Similarly, there were 12 questions on the form for the parents, some of which asked about age, education level, profession, economic status, and number of children.

Cognitive Behavioral Physical Activity Scale (CBPAS)

The CBPAS was developed by Schembre, Durand, Blissmer, and Greene (2015) to determine individuals' attitudes and behaviors regarding physical activity participation, and it was adapted to Turkish by Eskiler, Küçükibiş, Gülle, and Soyer (2016), after which validity and reliability analyses were conducted. All 15 items in the scale are scored with a 5-point Likert-type system. Cronbach's alpha reliability coefficient of the scale is 0.84. An increase in the mean total score of the scale indicates an increase in the level of physical activity (Eskiler et al., 2016).

Family Eating Attitude and Behavior Scale (FEABS)

This scale was developed by Neumark-Sztainer, Wall, Story, and Fulkerson (2004) to understand an individual's family dieting model and to determine its relationship with eating attitudes. Its Turkish adaptation and validity and reliability analyses were conducted by Mance (2006). The items in the scale are scored through a 4-point Likert-type system, and Cronbach's alpha reliability coefficient for the scale is 0.82. A higher score obtained on the scale indicates that there are healthier eating behaviors in the family, which is important insofar as healthy family meals have been shown to prevent uncontrolled weight gain in young people (Mance, 2006).

Family Health Climate Scale (FHC-scale)

Developed by Niermann et al. in 2014, this scale was constructed on the assumption that family members affect shared health behaviors. The scale is used to examine the effects of family environment on diet and physical activity behaviors. The items on the scale are scored with a 4-point Likert-type system, with possible responses including 0 = definitely false, 1 = rather false, 2 = rather true, 3 = definitely true. There are two subscales on the FHC-scale: the FHC-Physical Activity Scale (FHC-PA) and the FHC-Nutrition Scale (FHC-NU). The Family Health Climate reflects the individual experience of daily family life, the evaluation of health-related topics and expectations concerning typical values, behavior routines, and interaction patterns within the family. A positive Family Health Climate reflects that both being physically active and eating healthy is a very important and integral part of a family's daily life.

The FHC-PA consists of three sub-dimensions of value, cohesion, and information, and it has a total of 14 items. There are items that reflect the importance of being physically active for the whole family in the Value sub-dimension (items 1, 2, 3, 4, 5). In this respect, the lowest score is 0, and the highest score is 15. Higher scores indicate that physical activity is part of the daily lives of family members. There are items reflecting the common physical activities of family members and whether they have fun together or not in the Cohesion sub-dimension (items 6, 7, 8, 9, 10). In this context, the lowest score is 0 and the highest score is 15. An increase in scores indicates that family members do physical activities together and have fun during these activities. There are items reflecting the search, sharing, and use of information about sports and exercise among family members in the Information sub-dimension (items 11, 12, 13, 14). In this respect, the lowest score is 0, and the highest score is 12. Higher scores indicate that family members search, share and use information about sports and exercise.

The FHC-NU consists of four sub-dimensions of value, communication, cohesion, and consensus, and it has a total of 17 items. There are items reflecting the value family members attach to nutrition to improve health in their daily lives in the Value sub-dimension (items 1, 2, 3, 4). In this respect, the lowest score is 0, and the highest score is 12. The higher the score, the higher the value family members attach to health-enhancing nutrition in their daily lives. There are items reflecting the support of family members for each other in a balanced diet and that nutrition is the subject of family conversations in the Communication sub-dimension (items 5, 6, 7, 8, 9). In this respect, the lowest score is 0, and the highest score is 15. Higher scores indicate that nutrition is a part of family conversations and family members support each other in a balanced diet. There are items reflecting the importance family members attach to common family meals and eating with other family members in the Cohesion sub-dimension (items 10, 11, 12, 13, 14). In this respect, the lowest score is 0, and the highest score is 15. An increase in the score indicates that family members attach more importance to common family meals and eating with other family members. There are items reflecting whether family members agree with each other on issues related to daily eating behaviors in the Consensus sub-dimension (items 15, 16, 17). In this respect, the lowest score is 0, and the highest score is 9. An increase in the score indicates that family members agree with each other on issues related to daily eating behavior.

Procedure

Translation of scale items into Turkish

For the FHC-scale to be adapted to Turkish, first of all, Niermann, who developed the scale, was contacted via e-mail, and the necessary permission was obtained for the scale to be adapted. Then, the language validity of the scale was determined. For this purpose, the scale was translated from English to Turkish by three independent expert linguists. The translation was examined by the researchers, and the Turkish text that best represented each item was selected. The Turkish draft was then translated back into English. Again, three linguists, independent of each other, participated in the translation. It was then determined that the original scale and the back-translated text were consistent.

Pilot application

A pilot study was conducted before the research to determine whether the items of the scale that were prepared with the suggestions of the experts were clear, understandable, and applicable. In the pilot study, 30 participants (10 students, 10 mothers, and 10 fathers) who had characteristics similar to those of the sample group were contacted. The results were not included in the sampling. There were no misunderstood questions on the scale in the pre-application. Thus, the draft version of the Turkish version of the FHC-scale was confirmed for use.

Construct validity

Factor analysis

The Kaiser-Meyer-Olkin (KMO) test was performed to evaluate the suitability of the sample size and the data set for factor analysis; Bartlett's test of sphericity was used to determine the sample size. A KMO value above 0.60 and a statistically significant result of the Barlett's test indicated that the sample size was sufficient for factor analysis (Hadia, Abdullaha, & Sentosa, 2016). For the construct validity of the scale, exploratory and confirmatory factor analyses were performed.

Exploratory factor analysis

EFA is a process that determines the factor number of the measurement tool. A high variance ratio as a result of EFA indicates that the factor structure power of the scale is high. A total explained variance above 50% indicates that there is strong construct validity (Samuel, 2016). Items with a factor load below 0.30 are removed from the scale. EFA was applied to the Sample I group (396 participants = 132 students, 132 mothers, and 132 fathers), which were randomly selected from the total sample. As a result of the analysis, factor numbers with a factor eigen value of one and above were interpreted.

Confirmatory factor analysis

CFA is used to test whether there is a sufficient correlation between the factors determined with the help of EFA, which variables are related to which factors, whether the factors are independent of each other, and whether the factors are sufficient to explain the model (Erkorkmaz, Etikan, Demir, Özdamar, & Sanisoğlu, 2013). CFA was applied to the Sample II group (393 participants = 131 students, 131 mothers, and 131 fathers) that were randomly selected from the general sample. A number of compliance statistics can be utilized in CFA. The fit indices χ2/df, CFI, SRMR, and RMSEA were used to assess the goodness of fit (Schermelleh-Engel & Moosbrugger, 2003).

Criterion-related validity/concurrent validity

Criterion-related validity/concurrent validity is determined by comparing the scores from (a) the measurement tool that is assumed to measure the desired feature as a standard and (b) one or more measurement tools that are thought to measure the same feature (Mohajan, 2017). When the scores for each are compared, similar results indicate that there is criterion-related validity in the measurement tool. CBPAS was applied to examine the criterion validity of the FHC-PA, and FEABS was applied to examine the criterion validity of the FHC-NU.

Reliability analysis

Cronbach's alpha reliability coefficient

Cronbach's alpha internal consistency coefficients were evaluated in the reliability analyses of the FHC-PA and FHC-NU. A sufficient reliability coefficient of a measurement tool should be as close to one as possible. A measurement tool with a Cronbach's alpha coefficient less than 0.40 is considered

"not reliable," a value between 0.40–0.59 is considered as having "low reliability," a value between 0.60–0.79 is considered "quite reliable," and a value between 0.80–1.00 is considered "highly reliable" (Quansah, 2017).

Item-total score correlation coefficient

Item-total score correlation coefficients were analyzed to examine the relationship between the scores obtained from the scale items of the FHC-PA and FHC-NU and the total score of the scales. The item-total score correlation coefficient gives information regarding the extent to which the items in the measuring tool are related to each other. It has been stated that items in the measurement tool with item correlation values below 0.20 should be removed from a scale (Metsämuuronen, 2017).

Split-half reliability

To determine the consistency between the answers obtained from the FHC-scale, the split-half test of reliability was conducted. The Spearman–Brown coefficient, Guttman split-half coefficient, and Cronbach's alpha reliability coefficients were analyzed to calculate the split-half test reliability coefficient of the scale (De Vet, Mokkink, Mosmuller, & Terwee, 2017).

Collection of data

Before the data were collected, written permission was obtained from the Health Sciences Non-Interventional Clinical Investigations Ethics Committee where the study was to be conducted (Decision number: 2018/18-8). Three data collection forms in a closed envelope (with forms prepared separately for students, mothers, and fathers) were distributed to students studying at four high schools. The envelope also included an informed voluntary consent form prepared for the student's legal guardian (mother or father) to obtain permission for participation in the study. An explanation of the study was provided in each of the envelopes distributed in the classes by the researchers during the hours determined by the school administration. The students were told to return the questionnaire forms in a sealed envelope within two days. The envelopes that were returned on the specified date were collected by the researchers.

Statistical analysis

The research data were evaluated with SPSS 25.0 and AMOS 24. Number, percentage, mean, and standard deviation were used to evaluate the introductory characteristics of the participants in the study. The KMO test was used to evaluate the sample size and the suitability of the data set for factor analysis, and Bartlett's test of sphericity was used to determine the sample size. EFAs were used to test the construct validity of the scales. SPSS 25.0 was employed to explain the factor structure of each scale (FHC-PA and FHC-NU); principal component analysis was chosen for the extraction method, and the Promax approach was selected as the rotation method. CFAs were performed with AMOS 24 using the maximum-likelihood method. In testing the reliability of the scale, the reliability analyses of Cronbach's alpha reliability coefficient, item-total score correlation coefficient, and two reliability half-tests were used. The Spearman–Brown, Guttman split-half, and Cronbach's alpha reliability coefficients were examined to calculate the split-half test reliability coefficient of the scale. In the criterion-related validity/concurrent validity analysis conducted to examine the construct validity of the scale, the relationship between the scales was examined using Pearson product-moment correlation analysis.

Results

Socio-demographic characteristics of the participants

The demographic characteristics of the 789 participants (263 students, 263 mothers, and 263 fathers) is shown in Table 1. The mean age of the students was 14.60 ± 0.85 years, the mean age of the mothers was 41.17 ± 4.73, and the mean age of the fathers was 45.86 ± 5.15 years.

Construct (Concept) validity of the scale

Exploratory factor analysis

As a result of the EFA applied to the Sample I group, it was found that the KMO value of the FHC-PA was 0.909, its Bartlett's sphericity test value was X^2 = 3616.892, and the significance level was $p < .001$. The KMO value of the FHC-NU was 0.926, its Bartlett's sphericity test value was X^2 = 4217.646, and the significance level was $p < .001$. According to the results, the sample size was perfectly adequate to perform factor analysis when calculated for both surveys (0.90≤ KMO≤1.00) (Hadia et al., 2016). With respect to the EFA results, three factors with eigen values above one for 14 items on the FHC-PA, and four factors with eigen values above one for 17 items on FHC-NU were obtained. The factor loadings of the items on the FHC-PA varied between 0.70 and 0.89 and explained 70.654% of the total variance. Similarly, the factor loadings of the items on the FHC-NU varied between 0.74 and 0.89 and explained 70.740% of the total variance (Table 2).

Confirmatory factor analysis

The following are the results of the CFA applied to the Sample II group: χ2/df (cmin/df) = 3.966, p = .000, CFI = 0.94, SRMR = 0.04, and RMSEA = 0.08 for the FHC-PA (Table 3; insert Figure 1); and s2/

Table 1. Sociodemographic characteristics of the participants (n = 789).

Characteristics	Student (n = 263)		Mother (n = 263)		Father (n = 263)	
	n %		n %		n	%
Age (years) (Mean± SD)	14.60 ± 0.85		41.17 ± 4.73		45.86 ± 5.15	
Educational level[a]	-	-				
Primary school			70	26.7	27	10.3
Secondary school			39	14.8	20	7.6
High school			64	24.3	75	28.5
University			90	34.2	141	53.6
Health insurance						
Yes	242	92.0	242	92.0	242	92.0
No	21	8.0	21	8.0	21	8.0
Income status[a]	-	-				
Low			63	24.0	54	20.5
Moderate			137	52.0	134	51.0
High			63	24.0	75	28.5
Employment status[a]	-	-				
Employed			72	27.4	238	90.5
Unmployed			191	72.6	25	9.5
Job[a](n[1] = 72, n[2] = 238)	-	-				
Civil servant			50	69.4	128	53.8
Worker			9	12.5	37	15.5
Self-employment			8	11.1	55	23.1
Farmer			–	–	7	2.9
Other			5	6.9	11	4.6
Smoking						
Yes	4	1.5	36	13.7	110	41.8
No	259	98.5	227	86.3	153	58.2
Height(cm) (Mean ± SE)	166.56 ± 7.33		163.44 ± 5.49		175.25 ± 6.21	
Weight(kg) (Mean ± SE)	55.96 ± 11.11		68.97 ± 10.33		83.24 ± 10.49	

n^1 = Number of working mothers; n^2 = Number of working fathers, SD, standard deviation; [a]Asked only to mothers and fathers.

Table 2. Factor loads and total items core correlation of FHC-PA and FHC-NU scales (Sample I, n = 396).

FHC-PA					FHC-NU					
Item No.	Factor 1	Factor 2	Factor 3	Total Item Score Correlation	Item No.	Factor 1	Factor 2	Factor 3	Factor 4	Total Item Score Correlation
8	0.89			0.77*	13	0.86				0.66*
7	0.89			0.76*	11	0.86				0.68*
9	0.88			0.77*	12	0.82				0.66*
10	0.85			0.77*	10	0.82				0.68*
6	0.84			0.76*	14	0.80				0.65*
12		0.87		0.65*	7		0.86			0.73*
14		0.86		0.65*	6		0.85			0.75*
13		0.84		0.70*	5		0.80			0.69*
11		0.78		0.63*	9		0.83			0.79*
1			0.86	0.67*	8		0.78			0.75*
2			0.80	0.61*	2			0.89		0.72*
3			0.75	0.62*	1			0.88		0.74*
5			0.71	0.69*	3			0.78		0.73*
4			0.70	0.78*	4			0.74		0.70*
-					16				0.85	0.66*
-					17				0.82	0.62*
-					15				0.74	0.60*
Alfa (α = 0.923)	0.926	0.865	0.840		Alfa (α = 0.934)	0.893	0.892	0.860	0.750	
Variance (%)	50.491	62.362	70.654		Variance (%)	46.187	59.275	65.323	70.740	

FHC-NU: Family Health Climate Nutrition Scale.
FHC-PA: Family Health Climate Physical Activity Scale.
*p < .01.

Table 3. Goodness-of-fit indices for the FHC-PA and FHC-NU scales: confirmatory factor analysis (Sample II, n = 393).

Fit Criteria	FHC-PA Model Result	FHC-NU Model Result	Good Fit	Acceptable Fit
χ2/df(cmin/df)	3.966	2.935	$0 \leq$ χ2/df ≤ 3	<5
p-value	.000	.000	<.05	
CFI	0.94	0.94	$.97 \leq$ CFI ≤ 1	$.90 \leq$ CFI $< .97$
SRMR	0.04	0.03	$0 \leq$ SRMR $\leq .05$	$.05 <$ SRMR $\leq .10$
RMSEA	0.08	0.07	$\leq .05$	$.05 <$ RMSEA $\leq .08$

FHC-NU: Family Health Climate Nutrition Scale.
FHC-PA: Family Health Climate Physical Activity Scale.

df (cmin/df) = 2.935, *p* = .000, CFI = 0.94, SRMR = 0.03, and RMSEA = 0.07 for the FHC-NU (Table 3; insert Figure 2). When the values in the compliance indicators were examined, the CFA results showed that the FHC-PA and FHC-NU were at acceptable levels.

Criterion-related validity analysis

CBPAS was taken as the criterion to determine the criterion-related validity of the FHC-PA and FEABS to determine the criterion-related validity of the FHC-NU. In the correlation analysis, it was determined that there was a positive significant relationship between the sub-dimension and the total scores of the FHC-PA and the CBPAS (*p* < .01; Table 4).

Reliability analysis

Cronbach's alpha reliability coefficient

Cronbach's alpha reliability coefficients for the 14 items on the FHC-PA and the sub-dimensions of cohesion, information, and value were calculated as 0.926, 0.865, 0.840, and 0.923, respectively. Cronbach's alpha reliability coefficients for the 17 items on the FHC-NU and the sub-dimensions of
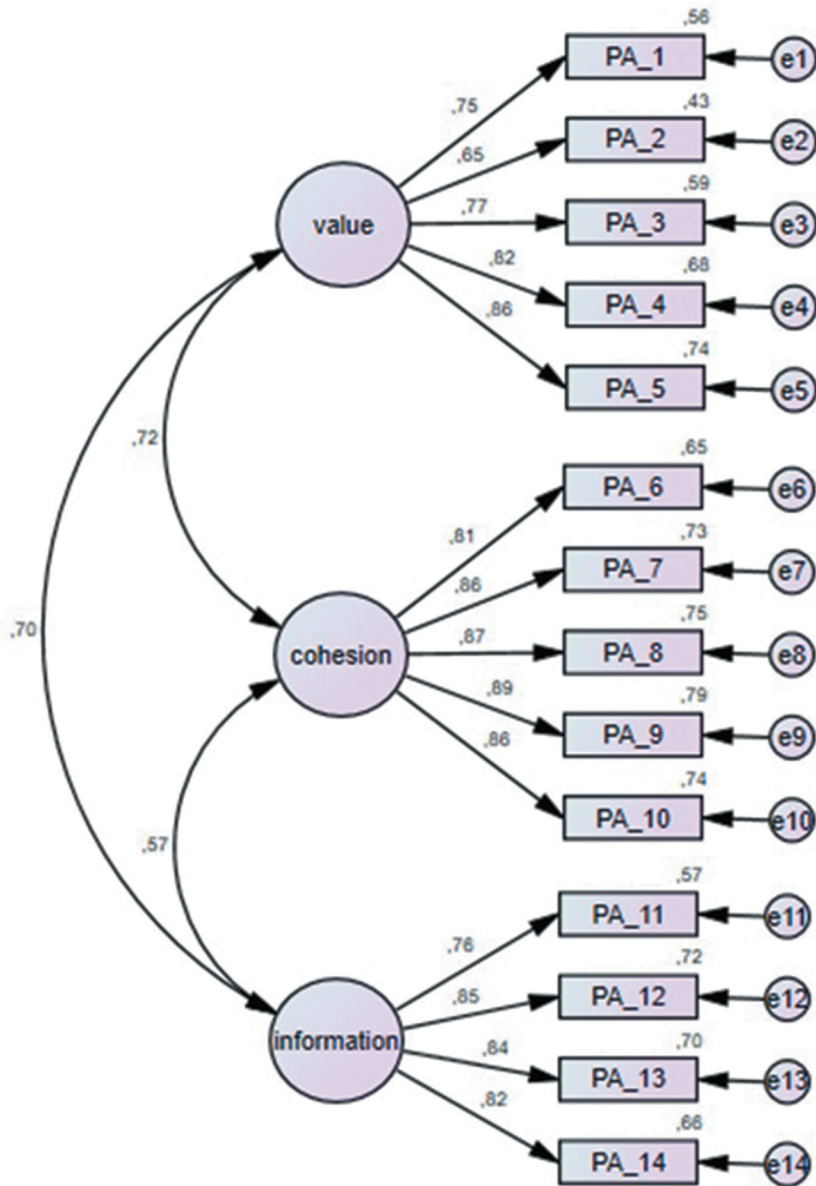
Figure 1. FHC-PA – standardized factor loadings and inter factor correlations.

cohesion, communication, value, and consensus were 0.893, 0.892, 0.860, 0.750, and 0.934, respectively ($p < .001$; Table 2).

Item-total score correlation coefficient

It was determined that the correlation coefficient between the total score of the FHC-PA and its items varied between $r = 0.61–0.78$, and the correlation between each item and the total score was statistically significant ($p < .001$; Table 2). Further, the correlation coefficient between the total score of the items on the FHC-NU and each of these items varied between $r = 0.60–0.79$, and the correlation between each item and the total score was statistically significant ($p < .001$). There were no items with a sub-dimension total score correlation (r) value below 0.20 (Table 2).
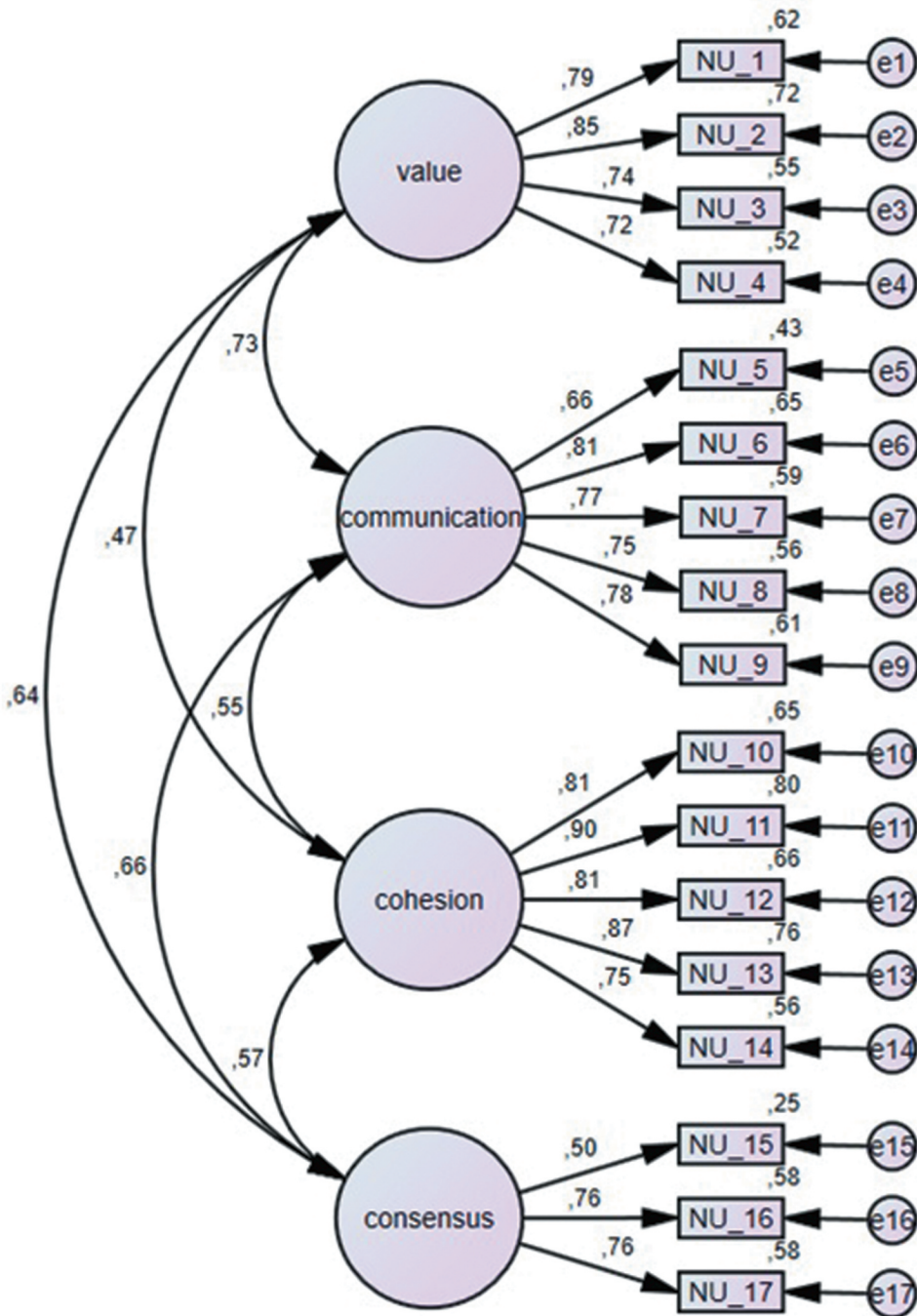
Figure 2. FHC-NU – standardized factor loadings and inter factor correlations.

Split-half test reliability

The Guttman split-half coefficient of the FHC-PA was determined as 0.865, and the Spearman–Brown coefficient was 0.865. It was found that Cronbach's alpha value of the first half (seven items) was 0.874, and the value for the second half (seven items) was 0.873; the correlation between the split halves was 0.763. The Guttman split-half coefficient of the FHC-NU was determined to be 0.831, and the

Table 4. The correlation between the mean scores of total and sub-dimensions CBPAS with FHC-PA and FEABS with FHC-NU.

Scales	Mean± SD	CBPAS r	Scales	Mean± SD	FEABS r
FHC-PA Total	36.61 ± 10.14	0.506*	FHC-NU Total	54.42 ± 9.79	0.359*
FHC-PA Value	8.28 ± 3.81	0.540*	FHC-NU Value	8.73 ± 2.69	0.271*
FHC-PA Information	5.08 ± 3.50	0.374*	FHC-NU Cohesion	12.56 ± 3.25	0.422*
FHC-PA Cohesion	9.25 ± 4.60	0.373*	FHC-NU Consensus	5.51 ± 2.30	0.234*
			FHC-NU Communication	10.62 ± 3.66	0.247*

*Correlation is significant at the 0.01 level (2-tailed).
FHC-PA: Family Health Climate Physical Activity Scale.
FHC-NU: Family Health Climate Nutrition Scale.
CBPAS: Cognitive Behavioral Physical Activity Scale.
FEABS: Family Eating Attitude and Behavior Scale.

Spearman–Brown coefficient was 0.845. Cronbach's alpha value of the first half (nine items) was 0.919, and the value of the second half (eight items) was 0.861; the correlation between the split halves was 0.732.

Discussion

Individual practices that affect health behavior are also impacted by the social environment. Therefore, the social environment must be taken into account when attempting to explain the health behavior of the individual. The family is the most stable social environment and, therefore, one of the most important (Niermann et al., 2014). For this reason, valid and reliable measurement tools should be used to determine the effects of families on nutritional and physical activity behaviors.

In this study, the FHC-Scale developed by Niermann et al. (2014) was adapted to the Turkish language, and validity and reliability analyses were performed. The findings obtained in this study support the validity and reliability of the FHC-Scale.

Examining the findings of the validity analysis

In the present study, the KMO values were similar to those of the original scale (Niermann et al., 2014) indicating that the sample size was sufficient for factor analysis (Hadia et al., 2016). Moreover, the Barlett's test results were similar to the original scale results (Niermann et al., 2014), revealing that the data in the study showed a suitable distribution for factor analysis. The variance value explained in this study was also found to be compatible with the values in the original study and since values of 50% and above are taken into account for the explained variance ratio in adaptation studies, the sufficient construct validity standard was met.

According to the EFA results, the factor loadings of the FHC-FAS varied between 0.70–0.89 and the factor loadings of FHC-NU ranged between 0.74–0.89. In the original version of the scale, the FHC-PA factor load values were found to be between 0.58 and 0.90, and the FHC-NU factor load values were between 0.62 and 0.82 (Niermann et al., 2014). In the Turkish adaptation of the FHC-PA (14 items and three sub-dimensions) and FHC-NU (17 items and four sub-dimensions), which included the original items in the scale, it was determined that the number of items and sub-dimensions showed the same distribution. It was also found that the fit index data used to test the compliance of the items with the data were in the appropriate range for the FHC-PA and FHC-NU, and that the construct validity of the scale was ensured. In the analysis of the original scale, it was also found that the fit indices were in a suitable range (Niermann et al., 2014).

In this study, a statistically positive moderate correlation was found between the total scores and sub-dimensions of FHC-PA and CBPAS, and similarly, a statistically positive poor correlation was

found between the total scores and sub-dimensions of the FHC-NU and FEABS ($p < .05$). In a study conducted on a second sample group for the original scale, the relationship between the FHC-PA and FHC-NU and similar scales was examined, and a significant correlation was found, which is similar to our findings (Niermann et al., 2014). Using a scale similar to the FHC to determine the relationship between adolescents' physical activity and nutritional behavior, the results also revealed that there was a significant relationship (Niermann, Kremers, Woll, & Renner, 2015). Similar findings were obtained between the FHC-NU and a similar scale used by Gerards Sanne et al. (2016) to investigate the effects of parents' eating behavior on that of their children (Gerards Sanne et al., 2016).

The results of the correlation analysis show that the FHC-PA and FHC-NU measurements were similar in structure to the measurement tools previously used in Turkey and with proven reliability.

Examining the findings of the reliability analysis

When the Cronbach's alpha values of the FHC-PA and FHC-NU were examined by Niermann et al. (2014) it was reported that they had a high level of reliability (Niermann et al., 2014). Given that a reliability coefficient that can be considered sufficient for a measurement tool if it is as close to one as possible (Bland & Altman, 1997; Bowling & Ebrahim, 2005), it was concluded that the FHC-PA and FHC-NU and their sub-dimensions met this requirement. It was also determined that this result for the FHC-NU was in accordance with the results of the study conducted by Gerards Sanne et al. (2016) who investigated the effects of parents' nutritional behavior on that of their children (Gerards Sanne et al., 2016); this result was also in accordance with those reported in the study conducted by Verjans-Janssen et al. (2019) to determine the relationship between the nutritional climate of the family and the nutritional behavior of children (Verjans-Janssen et al., 2019). Keath et al. (2017) conducted a study to determine whether the use of a physical activity intervention using the FHC-PA would lead to a behavior change in parents, and similar findings were obtained in the present study for the FHC-PA (Keath et al., 2017). Arroyo, Stillion Southard, Cohen, and Caban (2020) study also reported similar results, which was conducted using the FHC-PA and FHC-NU to determine the relationships between perceived mother communication behaviors and the body image of girls (Arroyo, Stillion Southard, Cohen, & Caban, 2020).

In the present study, it was found that the item-total correlation coefficients were above the acceptable value for item selection ($r \geq 0.20$ for all items in the scale). The correlation between each item and the total score was acceptable and statistically significant. These findings were similar to the item-total correlation coefficient results for the original scale and both the FHC-PA and FHC-NU (Niermann et al., 2014).

The split-half test reliability correlation values of the FHC-scale indicated a high level of correlation for the FHC-PA and FHC-NU. A split-half test reliability analysis was not conducted for the original scale.

Limitations of the study

This study has some limitations in terms of generalizability. Specifically, the fact that the study was conducted only with high school students and their families may limit the generalizability of the study. Since there may be a relationship between socioeconomic status and nutrition, this relationship should not be ignored. Including families from every income group in the research may limit the generalizability of the findings (for the FHC-NU). Despite its limitations, this study reveals that the Turkish version of the FHC-scale is valid and reliable.

Conclusion and recommendations

In light of the results obtained from the research, it was determined that the FHC-PA and FHC-NU are valid and reliable measurement tools in Turkish. The Turkish adaptation of the FHC-scale is recommended to be used in future planned studies to examine the effects of family environment on individual health behavior (including nutrition and physical activity) and to determine healthy and unhealthy family environments. Other studies can be planned with a sample that includes participants other than high school students (e.g., primary school and university students). In order to obtain stronger data on the validity and reliability of the FHC-scale, it is recommended that studies on groups that are homogeneous in terms of socioeconomic status be conducted. Further, the FHC-scale can be completed by all family members living together. Depending on the objectives of the research, the scales can be used together or separately.

Disclosure statement

No potential conflict of interest was reported by the author(s).

ORCID

Esra Güney http://orcid.org/0000-0002-9679-9325
Esra Karataş Okyay http://orcid.org/0000-0002-6443-8277
Tuba Uçar http://orcid.org/0000-0002-4450-6826

Authorship statement

The three authors contributed to this work, doing substantial contributions to the conception, design, analysis and interpretation of data and drafting the work or revising it critically for important intellectual content.

References

Arroyo, A., Stillion Southard, B. A., Cohen, H., & Caban, S. (2020). Maternal communication strategies that promote body image in daughters. *Communication Research*, *47*(3), 402–427. doi:10.1177/0093650218781737

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.

Bland, J. M., & Altman, D. G. (1997). Statistics notes: Cronbach's alpha. *British Medical Journal, 314*, 572.

Bowling, A., & Ebrahim, S. (2005). *Handbook of health research methods: Investigation, measurement and analysis*. UK: McGraw-Hill Education.

De Vet, H. C. W., Mokkink, L. B., Mosmuller, D. G., & Terwee, C. B. (2017). Spearmane Brown prophecy formula and Cronbach's alpha: Different faces of reliability and opportunities for new applications. *Journal of Clinical Epidemiology*, *85*, 45–49. doi:10.1016/j.jclinepi.2017.01.013

Ekvall, G. (1996). Organizational climate for creativity. European. *The European Journal of Work and Organizational Psychology*, *5*(1), 105–123. doi:10.1080/13594329608414845

Erkorkmaz, Ü., Etikan, İ., Demir, O., Özdamar, K., & Sanisoğlu, S. B. (2013). Confirmatory factor analysis and fit indices: Review. *Turkiye Klinikleri Journal of Medical Sciences*, *33*(1), 210–223. doi:10.5336/medsci.2011-26747

Eskiler, E., Küçükibiş, F., Gülle, M., & Soyer, F. (2016). The cognitive behavioral physical activity questionnaire: A study of validity and reliability. *Journal of Human Sciences*, *13*(2), 2577–2587. doi:10.14687/jhs.v13i2.3806

Fabrigar, L. R., Wegener, D. T., MacCallum, R. C., & Strahan, E. J. (1999). Evaluating the use of exploratory factor analysis in psychological research. *Pscyhological Methods*, *4*(3), 272–299. doi:10.1037/1082-989X.4.3.272

Gerards Sanne, M. P. L., Niermann, C., Gevers Dorus, W. M., Eussen, N., & Kremers Stef, P. J. (2016). Context matters! The relationship between mother-reported family nutrition climate, general parenting, food parenting practices and children's BMI. *BMC Public Health*, *16*(1), 1018. doi:10.1186/s12889-016-3683-8

Hadia, N., Abdullaha, N., & Sentosa, I. (2016). An Easy approach to exploratory factor analysis: Marketing perspective. *Journal of Educational and Social Research*, *6*(1), 215–223. doi:10.5901/jesr.2016.v6n1p215

Hammons, A. J., & Fiese, B. H. (2011). Is frequency of shared family meals related to the nutritional health of children and adolescents? *Pediatrics*, *127*(6), e1565–74. doi:10.1542/peds.2010-1440

Johnson, L., Van Jaarsveld, C., & Wardle, J. (2011). Individual and family environment correlates differ for consumption of core and non-core foods in children. *British Journal of Nutrition*, *105*(6), 950–959. doi:10.1017/S0007114510004484

Keath, A., Elliott, E., Bulger, S., Jones, E., Cottrell, L., & Pressgrove, G. (2017). *Physical Activity: Influencing Parent Behavior Change through Social Medi*a. College of Physical Activity and Sport Sciences Graduate Theses, Dissertations, and Problem Reports. 5952.

Kline, P. (1994). *An easy guide to factor analysis*. New York, NY: Routledge; Aktaran.

Lima-Rodríguez, J. S., Lima-Serrano, M., Jiménez-Picón, N., & Domínguez-Sánchez, I. (2013). Content validation of the self-perception of family health status scale using the Delphi technique. *The Revista Latino-Americana De Enfermagem*, *21*(2), 595–603. doi:10.1590/S0104-11692013000200017

Mance, O. (2006). The factors making first-year university students vulnerable to pathological eating attitudes [Master dissertation]. Ankara: Middle East Technical University.

Metsämuuronen, J. (2017). Item-total correlation as the cause for the underestimation of the alpha estimate for the reliability of the scale. *Global Journal for Research Analysis*, *5*(11), 571–577.

Mohajan, H. K. (2017). Two crıterıa for good measurements in research: Validity and reliability. *Annals of Spiru Haret University Economic Series*, *17*(4), 59–82. doi:10.26458/1746

Neumark-Sztainer, D., Wall, M., Story, M., & Fulkerson, J. A. (2004). Are family meal patterns associated with disordered eating behaviors among adolescents? *Journal of Adolescent Health*, *35*(5), 350–359. doi:10.1016/j.jadohealth.2004.01.004

Niermann, C., Krapf, F., Renner, B., Reiner, M., & Woll, A. (2014). Family health climate scale (FHC-scale): Development and validation. *International Journal of Behavioral Nutrition and Physical Activity*, *11*(1), 30. doi:10.1186/1479-5868-11-30

Niermann, C., Kremers, S., Woll, A., & Renner, B. (2015). Family health climate and adolescents' physical activity and healthy eating: A cross-sectional study with mother-father-adolescent triads. *Public Library of Science One*, *10*(11), e0143599. doi:10.1371/journal.pone.0143599

Niermann, C. Y. N., Spengler, S., & Gubbels, J. S. (2018). Physical activity, screen time, and dietary intake in families: A cluster-analysis with mother-father-child triads. *Frontiers in Public Health*, *6*, 276. doi:10.3389/fpubh.2018.00276

Patterson, M. G., West, M. A., Shackleton, V. J., Dawson, J. F., Lawthom, R., Maitlis, S., . . . Wallace, A. M. (2005). Validating the organizational climate measure: Links to managerial practices, productivity and innovation. *Journal of Organizational Behavior*, *26*(4), 379–408. doi:10.1002/job.312

Quansah, F. (2017). The use of cronbach alpha reliability estimate in research among students in public universities in Ghana. *Africa Journal of Teacher Education*, *6*(1), 17–21.

Samuel, P. (2016). *Advice on exploratory factor analysis* (pp. 1–8). Centre for Academic Success, Birmingham City University. http://bcu-test.eprints-hosting.org/6076/

Schembre, S. M., Durand, C. P., Blissmer, B. J., & Greene, G. W. (2015). Development and validation of the cognitive behavioral physical activity questionnaire. *American Journal of Health Promotion*, *30*(1), 58–65. doi:10.4278/ajhp.131021-QUAN-539

Schermelleh-Engel, K., & Moosbrugger, H. (2003). Evaluating the fit of structural equation models: Tests of significance and descriptive goodness-of-fit measures. *Methods of Psychological Research Online*, *8*(2), 23–74.

Verjans-Janssen, S., Van Kann, D., Kremers, S., Vos, S., Jansen, M., & Gerards, S. (2019). A cross-sectional study on the relationship between the family nutrition climate and children's nutrition behavior. *Nutrients*, *11*(10), 2344. doi:10.3390/nu11102344

Yüksel, M. (2019). The relationship between the family's participation in sports and the orientation of their children to elite sports. *Ordu University Social Sciences Institute Journal of Social Sciences Research*, *9*(2), 319–326.

Annex A. English versions of the Family Health Climate Scale (FHC-scale)
Annex B. Turkish versions of the Family Health Climate Scale (FHC-scale)

Table A1. FHC-PA (FHC-physical activity scale).

Subscales		In our family …	Definitely false	Rather false	Rather true	Definitely true
Value	1.	… we make a point of being physically active during daily life				
	2.	… it is normal to be physically active on a regular basis.				
	3.	… it goes without saying that we exercise and are physically active on a regular basis.				
	4.	… it is normal to be physically active in our leisure time.				
	5.	… we agree that physical activities are part of daily life.				
Cohesion	6.	… we like being together during physical activities (e.g. bike tours, hikes).				
	7.	… we enjoy exercising together.				
	8.	… we have fun doing physical activities together (e.g. bike tours, hikes)				
	9.	… we find it very pleasant to be physically active together.				
	10.	… we like spending time together in sports activities				
Information	11.	… we watch TV-programmes on physical activity and exercise.				
	12.	… we explicitly look for the latest information on physical activity and exercise to stay up to date.				
	13.	… we collect information (e.g. on the internet) on physical activity and exercise.				
	14.	… we read newspaper or magazine articles on fitness, physical activity, and exercise.				

Table A2. FHC-NU (FHC-nutrition scale).

Subscales		In our family …	Definitely false	Rather false	Rather true	Definitely true
Value	1.	… a healthy diet plays an important role in our lives.				
	2.	… we naturally pay attention to eating healthfully.				
	3.	… we routinely eat healthfully.				
	4.	… it is normal to choose healthful foods.				
Communication	5.	… we are interested in articles (e.g. in magazines) on healthful nutrition.				
	6.	… we remind each other to pay attention to a healthful diet.				
	7.	… we talk about which foods are healthful.				
	8.	… we support each other to refrain from unhealthful things.				
	9.	… we talk about how to eat healthfully.				
Cohesion	10.	… we appreciate spending time together during meals.				
	11.	… everybody enjoys having meals together.				
	12.	… eating together is a part of our daily family life.				
	13.	… we enjoy meals most when we sit at the same table.				
	14.	… we try to eat together as often as possible.				
Consensus	15.	… we rarely argue about food- or diet-related matters.				
	16.	… we agree on diet and nutrition.				
	17.	… we usually agree on meals and food choices.				

Tablo B1. ASİ- FAÖ (ASİ- Fiziksel Aktivite Ölçeği).

Alt boyutlar		Ailemizde . . .	Kesinlikle yanlış	Çoğunlukla yanlış	Çoğunlukla doğru	Kesinlikle doğru
Değer	1.	. . . günlük yaşamda fiziksel olarak aktif olmayı önemsiyoruz.				
	2.	. . . düzenli olarak fiziksel açıdan aktif olmak normaldir.				
	3.	. . . düzenli olarak egzersiz yaptığımızı ve fiziksel olarak aktif olduğumuzu söylemeye bile gerek yok.				
	4.	. . . boş zamanlarımızda fiziksel aktivite yapmak bizim için normaldir.				
	5.	. . . fiziksel aktiviteleri günlük yaşamımızın bir parçası olarak kabul ederiz.				
Bağlılık	6.	. . . fiziksel aktiviteler (bisiklet turları, yürüyüşler gibi) sırasında, birlikte olmayı seviyoruz.				
	7.	. . . birlikte egzersiz yapmaktan hoşlanıyoruz.				
	8.	. . . birlikte fiziksel aktivite yaparken eğleniyoruz (bisiklet turları, yürüyüşler gibi)				
	9.	. . . birlikte fiziksel olarak aktif olmayı zevkli buluyoruz.				
	10.	. . . spor aktivitelerini yaparken birlikte vakit geçirmeyi seviyoruz.				
Bilgi	11.	. . . fiziksel aktivite ve egzersiz ile ilgili TV programları izleriz.				
	12.	. . . fiziksel aktivite ve egzersiz ile ilgili son güncel bilgileri araştırırız.				
	13.	. . . fiziksel aktivite ve egzersiz ile ilgili bilgi ediniriz (örneğin internet yoluyla vb.)				
	14.	. . . fitness, fiziksel aktivite ve egzersiz ile ilgili haberleri veya köşe yazılarını okuruz.				

Tablo B2. ASİ- BÖ (ASİ- Beslenme Ölçeği).

Alt boyutlar		Ailemizde . . .	Kesinlikle yanlış	Çoğunlukla yanlış	Çoğunlukla doğru	Kesinlikle doğru
Değer	1.	. . . sağlıklı beslenme, hayatımızda önemli bir rol oynar.				
	2.	. . . elbette sağlıklı beslenmeye dikkat ederiz				
	3.	. . . her zaman sağlıklı besleniriz.				
	4.	. . . sağlıklı yiyecekler seçmek önemlidir.				
İletişim	5.	. . . sağlıklı beslenme ile ilgili haberler ilgimizi çeker.				
	6.	. . . birbirimize sağlıklı beslenmeye dikkat etmeyi hatırlatırız				
	7.	. . . hangi yiyeceklerin sağlıklı olduğu hakkında konuşuruz.				
	8.	. . . sağlıksız şeylerden uzak durmak için birbirimizi destekleriz.				
	9.	. . . nasıl sağlıklı besleneceğimiz konusunda konuşuruz.				
Bağlılık	10.	. . . yemek sırasında birlikte vakit geçirmek bizim için değerlidir.				
	11.	. . . hepimiz birlikte yemekten hoşlanırız.				
	12.	. . . birlikte yemek günlük yaşantımızın bir parçasıdır.				
	13.	. . . aynı sofrada oturduğumuzda, yemekten daha çok keyif alıyoruz.				
	14.	. . . mümkün olduğu kadar birlikte yemeye çalışıyoruz.				
Uzlaşma	15.	. . . yiyecekler konusunda nadiren anlaşmazlığa düşeriz.				
	16.	. . . diyet ve beslenme hakkındaki konularda hemfikiriz.				
	17.	. . . genellikle yiyecek ve öğün seçimlerinde hemfikiriz.				