Psychometric properties of the Turkish version of the weight efficacy lifestyle questionnaire short-form for adolescents

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Abstract

The prevalence of obesity in children has greatly increased, and many reasons account for the increase. Self-efficacy in controlling eating behaviour is known to be inversely related to obesity prevalence. Moreover, the level of self-efficacy can be increased. However, there is no scale adapted to the Turkish setting that can evaluate self-efficacy in controlling eating behaviour. This study aimed to adapt the Weight Efficacy Lifestyle Questionnaire Short-Form to the Turkish language. The study sample included 392 adolescents aged 14–18. Data were collected through a socio-demographic data collection form and the Weight Efficacy Lifestyle Questionnaire Short-Form. The mean and percentage calculations were used in the analysis of the socio-demographic data. The principal components analysis determined that the scale consisted of one dimension. The explained variance was determined as 49.1%, and the factor loadings were .57–.78. The confirmatory factor analysis yielded a root mean square error of approximation of .06 and fit indices greater than .96. The Cronbach's alpha coefficient for overall scale was .84. The Cronbach's alpha values of both halves of the split-half method and the Spearman–Brown and Guttman's split-half coefficients were found to be greater than .70. The correlation of the items with the total score was positive and greater than .20. Thus, the Weight Efficacy Lifestyle Questionnaire Short-Form had a high level of validity and reliability for the Turkish adolescent sample. This scale can be used to determine self-efficacy in controlling eating behaviour change according to the current status of adolescents.

Keywords Eating behaviour · Self-efficacy · Adolescents · Obesity · Lifestyle

Introduction

Obesity is a clinical condition that occurs because of the greater energy intake than the body's needed and the storage of excess energy as fat. It is defined as the abnormal or excessive fat accumulation, which poses a health risk (World Health Organization (WHO) 2018). The incidence of obesity has more than doubled in the last three decades (WHO 2018). It does not only affect adulthood but also childhood. According to the 2016 data of the World Health Organization, 650 million adults, 124 million children aged 5–19 and 41 million children younger than 5 years are obese (WHO 2018). Moreover, obesity is predicted to affect more than 60 million children by 2020 (WHO 2018). In Turkey, 660,000 children

aged 0–5 and 1.3 million children aged 6–18 have lived with an obesity problem (Turkey Mother, Child and Adolescent Health Institute, TUSEB 2018). In some studies, the incidence of overweight and obesity in adolescents reached 20%–31% (Yılmaz et al. 2018; Meşe Yavuz and Koca Özer 2019).

Physiological problems such as diabetes, hypertension, respiratory disorders and osteoarthritis as well as psychological and social problems can be seen in children who are obese in childhood (Sahoo et al. 2015; Sevaliev et al. 2019). About 70%–80% of those who were obese in childhood also suffer from obesity in adulthood (WHO 2016). In addition, obese individuals are more likely to have chronic diseases, such as coronary heart disease, some cancers, cerebrovascular diseases and diabetes, than those who are not obese (Centers for Disease Control and Prevention (CDC) 2016; Weihrauch-Blüher et al. 2019). The morbidity and mortality rates of obesity are increasing because of these associated problems (Weihrauch-Blüher et al. 2019; Williams et al. 2015).

In studies investigating children who are evaluated as obese, obesity is seen as a multidimensional problem (Sahoo et al. 2015; Sevaliev et al. 2019). Eating

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attitudes, such as emotional eating, having breakfast, fast food consumption and skipping meal times, are one of these factors. (Sahoo et al. 2015; Sevaliev et al. 2019). Choosing healthy foods, avoiding junk food, eating as much as the body needs by evaluating the status of hunger and fullness effectively, not resorting to eating to get rid of negative emotions and preventing overeating due to the influence of the environment or social environment are all indicators of the level of healthy eating self-efficacy (Kulik et al. 2019; Chae et al. 2018; Bagheriya et al. 2017; Isa et al. 2019; Suorsa et al. 2016). Self-efficacy was proposed by Albert Bandura (1997), and it is defined as the belief of individuals in their own abilities to develop and implement the strategy they need for managing the situations that they encounter or may encounter. Studies report that children with high levels of self-efficacy have a more balanced diet, consume more vegetables, have healthier eating habits and are more physically active (Isa et al. 2019; Suorsa et al. 2016).

Individuals with high self-efficacy levels were found to be more successful in weight loss (Isa et al. 2019), as being knowledgeable about obesity or healthy nutrition was not enough to achieve the necessary behavioural changes for maintaining their ideal weight or gaining their ideal weight (Chae et al. 2018). A driving force is needed to achieve these behavioural changes. Self-efficacy for controlling eating behaviour, which helps transform the acquired knowledge into a healthy life behaviour and is a psychosocial health indicator, is considered a source of this driving force (Bandelli et al. 2017; Elmore and Sharma 2014).

According to Bandura's theory, the self-efficacy level can increase through applied training, personal experiences and social learning methods (Bleich et al. 2018; Bagheriya et al. 2017). To determine whether such an increase exists, valid and reliable measurement tools are needed. Scales such as the Self-Perceived Food Literacy Scale (Poelman et al. 2018), Eating Self-Efficacy Scale (Glynn and Ruderman 1986), Children's Fruit, Vegetable, Water and Physical Activity Self-Efficacy Scales (Wang et al. 2017) and Weight Efficacy Lifestyle Questionnaire Short-Form (Ames et al. 2012) can be found in the literature. These scales can determine the status of people's self-efficacy in cooking, food literacy, healthy eating and physical activity. However, there is no such scale that makes this measurement suitable for adolescents and that is adapted to Turkish. Thus, this study aimed to adapt the Weight Efficacy Lifestyle Questionnaire Short-Form (WEL-SF) to the Turkish language for adolescents. This scale has only eight-items, the other scales have 25 and over items, so it is short, practical and easy to apply than the others. It is used to determine the level of eating control self-efficacy and it can determine the ability to control overeating attitudes in certain conditions in adolescents aged 14–18.

Materials and Method

Participants and Procedures

This study used a descriptive and correlational design. It was conducted in three high schools located in the Aegean region of Turkey in the spring semester of academic year 2018–2019. The study sample consisted of students from the three high schools. According to the 5 s, 10s and 100 s rule, which is recommended for sample size calculation, at least five subjects per item should be recruited for a factor analysis in scale development studies (Karagöz 2018). Weight Efficacy Lifestyle Questionnaire-Short Form comprises eight items. The recruitment of 20 students per item was planned for the sample size, and thus the sample size was calculated as 160 students. Eventually, 392 students who agreed to participate in the study and filled out the scale completely were recruited. Thus, the invariance property of the study was determined more clearly, and no data loss was observed.

The approval of the developers of the scale was obtained for the Turkish adaptation of the scale and its utilisation. Written approval of the Non-Interventional Ethics Committee of the affiliated institution (IRB No: 4512-GOA-2019/02–17) and the institution where the work was conducted was obtained. The informed written consent of the parents of the children participating in the study and the verbal consent of the children were taken.

Measures

Socio-Demographic Data Collection Form The form, which the adolescents filled out, consists of six items determining the age, gender, class, body weight and height of the adolescents.

Weight Control Self-Efficacy Lifestyle Scale-Short Form This 10-point Likert-type scale (0–Not confident at all, 5–Confident, 10–Highly confident) was developed by Ames et al. in 2012. It measures weight control self-efficacy, which has an important place in the prevention of childhood obesity and eating self-efficacy to avoid malnutrition attitudes that cause more calorie intake than the body needs. The scale consists of eight questions, including 'I can resist overeating when I am anxious/tired/depressed/angry' and 'I can resist overeating when I am watching TV', to understand how overeating attitudes change in certain situations. Its Cronbach's alpha coefficient is .95. The factor loadings of the scale items are .52–.80. The minimum and maximum scores that can be obtained from the scale vary by 0 and 80, respectively. The higher the score is, the higher the self-efficacy level in preventing overeating behaviour in certain situations (Ames et al. 2012).

Data Analysis

SPSS 24.0 and LISREL 8.7 software were used to evaluate the data. The percentage and mean values for the descriptive statistics were used for the analyses. To determine the validity and reliability of the scale for the Turkish sample, the following analyses were performed.

Translation of the Scale In the adaptation of a scale to another language, using the most appropriate sentence structures and idioms in the target language and making the statements suitable for the target culture are necessary (Karagöz 2018; Çam and Baysan-Arabacı 2010; Nunnally and Bernstein 2010). For this purpose, the scale was translated to Turkish by three English language experts. After the scale was translated to Turkish, the Turkish version was developed by the researchers through group work. The Turkish version of the scale was translated back to English by a different linguist who was an expert in both Turkish and English languages.

Content Validity of the Scale When a scale is translated to another language, obtaining the opinions of at least three experts is recommended to determine the equivalence of the original scale (Karagöz 2018). In this study, five academicians in paediatric nursing, two nutritionists, one psychologist and one paediatrician reviewed the translated scale. The experts were given the original and translated versions of the scale and asked to rate each item in the translated version, with the score ranging from 1 to 4 (1 = needs many changes, 2 = needs a few changes, 3 = appropriate, 4 = highly appropriate), to assess the appropriateness of the items. The scale items were revised according to the recommendations of the experts. The item-level content validity index (I-CVI) for each item in the scale and for the overall scale and the scale-level content validity index (S-CVI) were calculated. A fit ratio of .80 and above for the I-CVI and S-CVI indicates an agreement between experts (Yeşilyurt and Çapraz 2018; Crestani et al. 2017; Nunnally and Bernstein 2010).

Reliability of the Scale Reliability of the scale was analysed using internal consistency and invariance analyses. For the internal consistency, Cronbach's alpha, item total score, item subscale total score, and floor and ceiling effects were employed. The minimum acceptable Cronbach's alpha value should be .70 (Karagöz 2018; Nunnally and Bernstein 2010). The item–total score correlation coefficient is recommended to be at least .20 and positive (Karagöz 2018; Büyüköztürk 2012). The item–total score correlation shows how much the items in the scale is correlated with the scale and how effectively and adequately the scale measures the quality to be measured (Karagöz 2018; Nunnally and Bernstein 2010). The floor and ceiling effect of the scale is recommended to be below 15% to not affect the validity and reliability

(Karagöz 2018; Nunnally and Bernstein 2010). Hotelling's T^2 test was performed to determine whether the scale has a response bias. Tukey's additivity test was performed to assess whether the scale is summable. Another method that helps to determine the level of reliability is the split-half method. In this method, the Cronbach's alpha values of the halves and the Spearman–Brown and Guttman's split-half coefficients should be above .70, and there should be a strong and significant relationship between the two halves (Karagöz 2018; Heale and Twycross 2015; DeVellis 2012; Jonhson and Christensen 2014; Hayran and Hayran 2011).

Construct Validity of the Scale The construct validity of the scale was determined using the exploratory and confirmatory factor analysis (CFA). The Kaiser–Meyer–Olkin (KMO) coefficient and the Barlett Sphericity test were employed to determine whether the data were sufficient and suitable for the factor analysis. To perform the factor analysis, the Barlett Sphericity test value is recommended to be $p < .05$ and the KMO value to be greater than .60. The principal component method and the varimax rotation method were used to determine the construct validity of the scale. In determining the most suitable construct and the number of factors, the eigenvalue was considered to be 1 and higher (Karagöz 2018; DeVellis 2012; Jonhson and Christensen 2014; Hayran and Hayran 2011). Experts emphasise that the minimum factor value should be .30 (Karagöz 2018; Nunnally and Bernstein 2010; Çam and Baysan-Arabacı 2010). In this study, the minimum factor loading, which is used to determine the item–factor match, was considered as .30 (Karagöz 2018; DeVellis 2012; Jonhson and Christensen 2014; Hayran and Hayran 2011).

The other method used to determine construct validity is the CFA. As a result of the CFA, Pearson's chi-square, degree of freedom, root-mean-square error of approximation (RMSEA), goodness of fit index, comparative fit index and normal fit index (NFI) were investigated as the fit indices. The results of these fit indices confirmed the model fit of the theory. For this fit, the division of the chi-square value by the degree of freedom should be smaller than 5, the RMSEA below .08, and the other fit indices greater than .90 (Karagöz 2018; DeVellis 2012; Jonhson and Christensen 2014). The one-way ANOVA test was used to determine whether the difference between the scores of the students classified according to the body mass index (BMI) status was statistically significant.

Results

The age of the participants ranged from 14 to 18, and the mean age was 15.93 ± 1.10 years. The rate of the female participants was 56%, the normal weight rate was 65%, and the

overweight and obese rate was 17%. According to the students, 17.9% considered themselves obese, and 64% thought that they had a normal weight. The mean BMI was 21.15 ± 3.70. In terms of body satisfaction, 50% of the students were content with their body, and 19.1% were not. The mean age of the mothers was 42.89 ± 5.56, and 35% were university graduates. The mean age of the fathers was 47.20 ± 5.63, and 40% were university graduates. In terms of economic status, 48% of the participants had equal household income and expenses, and 38% had more income than expenses.

The item-level content validity index of the scale was found to vary by .95 and .99, and the scale-level content validity index was .96. As a result of the explanatory factor analysis (EFA), the KMO coefficient was .85, the Bartlett test X^2 value was 1220.23, and the p value was less than .01. Varimax rotation was performed according to the principal components analysis (PCA). Only one factor with an eigenvalue greater than 1 was found, and this one dimension accounted for 49.1% of the total variance. The factor loadings of the *EFA* of the scale were .54–.80 (Table 1).

As a result of the CFA, the fit indices were determined as follows: $X^2 = 31.35$, $df = 12$, $X^2/df = 2.61$, $RMSEA = .06$, $GFI = .98$, $CFI = .99$, $IFI = .99$, $NFI = .98$, $TLI = .98$ and $RFI = .96$. The factor loadings of the scale ranged between .39 and .85 (Table 2) (Fig. 1).

The Cronbach's alpha coefficient of the overall scale was .84. As indicated by the split-half analysis, the Cronbach's alpha value of the first half was .77, the Cronbach's alpha value of the second half was .72, the Spearmen–Brown coefficient was .82, the Guttman's split-half coefficient was .82 and the correlation coefficient between the halves was .70. For the overall scale, the floor effect was .8%, and the ceiling effect was 6.6% (Table 3).

Table 1 Factor loadings for the one extracted factor after varimax rotation ($n = 392$)

Items	Factor loadings	Explained variance %	Eigenvalue
1		49.1	3.929
	.790		
2			
	.764		
3			
	.668		
4			
	.654		
5			
	.763		
6			
	.571		
7			
	.803		
8			
	.542		

Hotelling's T^2 analysis was performed to determine the response bias on the scale, and Hotelling's T^2 value was found to be 99.87, $F = 14.048$ and $p < .01$. No response bias was found on the scale.

Tukey's test of additivity was performed to determine whether the scale was additive. The values were determined as $F = .14$ and $p = .70$. Thus, the scale was found to comprise one dimension and to have an additive nature (Table 4). The inter-item correlation was found to be .25–.69.

According to the one-way ANOVA test, the mean score of the scale was 56.07 ± 19.13 in underweight adolescents ($n = 69$), 54.78 ± 17.41 in normal-weight adolescents ($n = 255$), 48.94 ± 15.46 in overweight adolescents ($n = 39$) and 48.44 ± 16.01 in obese adolescents ($n = 29$) ($p < .05$).

Discussion

In this study, the Weight Efficacy Lifestyle Questionnaire Short-Form, which was designed to measure the level of self-efficacy in controlling eating attitudes in certain situations, was adapted to Turkish, and its validity and reliability study was conducted for the adolescent age group.

Both the *I-CVI* and *S-CVI* levels were found to be above .80. The fact that the content validity ratio was above .80 was accepted as evidence of consensus among experts in the literature (Alpar 2018; Davis 1992; Polit et al. 2007). These results showed that there was a high level of agreement among the experts, the scale items were in accordance with the Turkish culture, the items represented the area to be measured and the content validity was ensured. Moreover, the structure obtained from the original scale and the scale adapted to Turkish were similar (Ames et al. 2012).

The Bartlett chi-square test and the KMO value revealed properly correlated factors, an adequate sampling and a justifiable factor analysis (Karagöz 2018; DeVellis 2012; Jonhson and Christensen 2014; Hayran and Hayran 2011). The *PCA* confirmed the presence of a one-factor structure similar to the original study (Ames et al. 2012). In the Norwegian version of the WEL-SF, the *PCA* resulted in one factor with an eigenvalue greater than 1, but the Persian version has a two-factor structure (Flølo et al. 2014; Ahmadipour and Ebadi 2019). The single-factor structure of the original scale (WEL-SF) was also confirmed for the Turkish adolescents. The explained variance in this study was 49.1%, and that for the original scale was 49% (Ames et al. 2012). The variance values found for the adapted scale in this study and those of the original scale were similar. This result showed the similarity of the structures of the original and the Turkish adapted version. The fact that the factor loadings were greater than .30 and similar to those of the original scale showed that the version adapted to Turkish for the Turkish adolescent age group

Table 2 Model fit indices of the the Weight Efficacy Lifestyle Scale-Short Form for Adolescent

One factor	X^2	DF^a	X^2/DF	$RMSEA^b$	GFI^c	CFI^d	IFI^e	RFI^f	NFI^g	TLI^h
model	31.35	12	2.61	.064	.98	.99	.99	.96	.98	.98

[a] Degree of Freedom, [b] (Root Mean Square Error of Approximation, [c] Goodness of Fit Index, [d] Comparative Fit Index, [e] Incremental Fit Index, [f] Relative Fit Index, [g] Normed Fit Index, TLI (NNFI): Trucker-lewıs Index

preserved the original structure and that it had a strong factor structure (Ames et al. 2012).

The factor loadings and indices of the CFA were within the limits stated in the literature. The CFA results of this study showed that the scale validated the single-factor structure, the items adequately explained the factor to be measured and the scale was able to adequately measure the quality to be measured (Karagöz 2018; DeVellis 2012; Jonhson and Christensen 2014; Hayran and Hayran 2011). The results of both EFA and CFA indicated that the scale had a strong factor structure for the Turkish adolescent sample. In addition, these results showed that the scale could measure the self-efficacy for controlling eating behaviour in a consistent and reliable manner in Turkish adolescents. The CFA results of this study could not be compared with those of the original scale because no CFA results were provided (Ames et al. 2012).

The instrument had good internal consistency (Cronbach's alpha coefficient = .84) that was compatible with similar studies. Ames et al. revealed that the original version had excellent internal consistency (Cronbach's alpha coefficient = .95). Flølo et al. (2014) found a strong internal consistency (Cronbach's alpha coefficient = .92) for the Norwegian version of WEL-SF, and Ahmadipour and Ebadi (2019) found a good internal consistency (Cronbach's alpha coefficient = .83) for the Persian version of WEL-SF.

The result of the split-half analysis used in this study showed a high level of correlation between the two halves, and the two halves had high values of Cronbach's alpha, Spearmen–Brown and Guttman's split-half coefficients. The scale consisted of closely related items; the items measured the same quality, and the scale had a homogeneous structure and high internal consistency. This result showed that the scale could measure the self-efficacy for controlling eating

behaviour in a consistent and reliable manner in Turkish adolescents (Ames et al. 2012).

In this study, response bias was evaluated with Hotelling's T^2 analysis. This analysis showed that no response bias was found and that the adolescents answered the questions on the scale according to their own opinions. The scale was found to have a consistent structure and to measure the adolescents' expectations about the results in a consistent manner. This finding could not be compared with that of the original scale because related findings were not supplied in the original study (Ames et al. 2012). The floor effect value of the scale was .8%, and the ceiling effect was 6.6%. These values indicated that the scale was a reliable measurement tool and that it could adequately measure the concept to be measured (Karagöz 2018; DeVellis 2012). This finding could not be compared with that of the original scale because related findings were not supplied in the original study (Ames et al. 2012).

The correlations of the items with the total score obtained in this study were found to be positive and greater than .20. All the items on the scale had a high level of correlation with the total score of the scale. The scale items measured adequately the quality to be measured, and they had a high level of reliability. These results could not be compared with those of the original scale because no relevant results were given (Ames et al. 2012).

Inter item correlation reveals that whether there are unnecessary items that are similar and highly correlated in the scale. İf there is this causes the alpha value to be higher than it is. In this study, it was determined that the correlations between the items were moderate and there is no unnecessary item. And the correlation between the items showed that the data were homogeneously distributed and consisted of items measuring
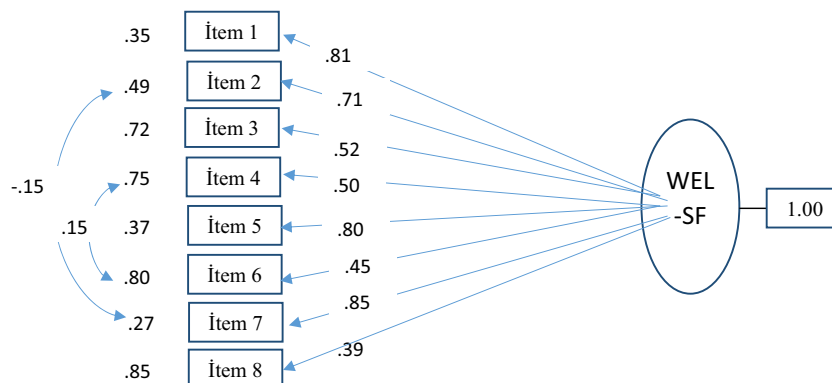
Fig. 1 Confirmatory factor analysis of the Weight Efficacy Lifestyle Qestionnaire Short-Form

Table 3 Scale reliability results (n = 392)

Sub-scales	Cronbach α	First half cronbach α	Second half cronbach α	Spearman-Brown	Guttman split-half	Correlation between two halves	M ± SD (Min-Max)	Floor effect %	Ceiling effect %
Total scale	.848	.773	.722	.825	.825	.702	51.36 ± 9.98 (21–65)	0.8	6.6

a similar structure. These results showed that the scale and items were reliable for the Turkish sample. Since these results were not given in the original scale, no comparison could be made (Ames et al. 2012).

The results obtained from this study; the adapted scale consists of one-dimension and eight items as in the original scale. In this study, the adapted scale explained 49.1% of the total variance and in the original scale explained 49% (Ames et al. 2012). This similarity between the explained variances shows that there is a structural similarity between the scales adapted to different cultures. In this study, there is a similarity between the explanatory factor loads and the original scale's factor loads. Confirmatory factor analysis was not performed in the original study. In this study, as a result of confirmatory factor analysis, single-factor structure of the scale was confirmed and factor loadings were over .30. A similarity was found between the alpha coefficient and the original coefficient in this study. This similarity shows that the original scale's structure was also preserved in the Turkish version.

Despite its strengths, the current study has some limitations. Initially, a random sampling method was used, and only the volunteers were included in the study. This situation caused a decrease in the number of samples, thus hindering the generalisability of the results. Moreover, BMI and socioeconomic status distribution were not equivalent in size in the sample. Another limitation of this study, lack of convergent, divergent and discriminant validity. Given these limitations, adolescents diagnosed with clinical obesity should be included in the sample, and the distribution of BMI and economic status should be similar in future studies examining the psychometric properties of the scale. Convergent, divergent and discriminant validity analysis can make for a robust and comprehensive adaptation and validation study.

Conclusion

Weight Efficacy Lifestyle Questionnaire Short-Form for Adolescents was determined to have a high level of validity and reliability for the Turkish adolescent sample group. By using this scale, researchers and clinicians can determine the changes in the self-efficacy level to control overeating behaviours in situations such as when angry, stressed or upset or when watching television, thus helping adolescents to control their weight. Moreover, they can develop programmes to eliminate the situations in which the problem of overeating occurs. Cross-cultural comparative studies can also be conducted using the scale.

Compliance with Ethical Standards

Table 4 Correlations of the item total score (n = 392)

Items	Items-total score correlation[*]
1.	.765*
2	.756*
3	.669*
4	.663*
5	.749*
6	.604*
7	.785*
8	.576*

*p < .001

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