RESEARCH ARTICLE / *Araştırma Makalesi*

The Validity and Reliability of the Turkish Version of the Modified Yale Food Addiction Scale Version 2.0

Modifiye Edilmiş Yale Yeme Bağımlılığı Ölçeği Sürüm 2.0'ın Türkçe Uyarlamasının Geçerlilik ve Güvenilirlik Çalışması

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Abstract

Introduction	In this study, we aimed to test the validity and reliability of the Turkish version of the modified Yale food addiction scale version 2.0, which has been developed to evaluate the substance use disorder criteria in DSM V in 2017 in terms of food addiction.
Materials and Methods	The methodological and descriptive study was performed in seven family medicine units between June 2017 and March 2018. A total of 271 people was included in the study, and the questionnaire was asked to answer a total of 32 questions, including 13 questions about phrasing, socio-demographic characteristics, habits, current diseases, and 19 questions about weight. In statistical analyses, the validity of the scale was tested for language validity, content validity, factor validity, and construct validity. In the reliability analysis, internal consistency and time invariance of the scale against time were evaluated. A p-value of <0.05 was considered significant
Results	The mean age of the 271 participants (75.6% female) was 39.23±12.66 SD, and the mean body mass index (BMI) was 29.249±6.113 SD. After the language validity of the scale, the content validity of the scale (Davis value≥0.80), compatibility with factor analysis (KMO value 0.709 and Barlett sphericity test result p<0.001), and internal consistency (Cronbach alpha coefficient 0.802) were found sufficient.
Conclusion	mYFAS 2.0 can be used as a data collection tool in 'food addiction' screening.
Keywords	Food Addiction; Validity; Reliability

Öz

Amaç	*Bu çalışmada 2017 yılında DSM 5'teki madde kullanım bozukluğu kriterlerini yeme bağımlılığı açısından değerlendirmek için geliştirilen modifiye edilmiş Yale yeme bağımlılığı ölçeği sürüm 2.0'ın Türkçe'ye uyarlanarak geçerlik ve güvenilirliğinin sınanması amaçlanmıştır.*
Yöntem ve Gereçler	*Metadolojik ve tanımlayıcı tipteki araştırma 7 aile hekimliği birimine Haziran 2017-Mart 2018 tarihleri arasında başvuran hastada yapıldı. Toplam 271 kişinin dahil edildiği araştırmada ölçeğe ait 13 ifade, sosyo-demografik özellikler, alışkanlıklar, mevcut hastalıklar, ve kiloyla ilgili 19 soru olmak üzere toplam 32 sorunun cevaplanması istendi. İstatistiksel analizlerde ölçeğin geçerliği değerlendirilirken dil geçerliği, kapsam geçerliği (content validity), faktör analizine uygunluğu ve yapı geçerliği test edildi. Güvenirlik analizinde iç tutarlılık ve ölçeğin zamana karşı değişmezliği değerlendirildi. p<0,05 anlamlı kabul edildi.*
Bulgular	*Toplam 271 katılımcının (%75,6'sı kadın) yaş ortalamaları 39,23±12,66 SS ve beden kitle indeksi (BKİ) ortalamaları 29,249±6,138 SS idi. Ölçeğin dil geçerliği sağlandıktan sonra kapsam geçerliğinin (Davis sayısı ≥ 0,80), faktör analizine uygunluğunun (KMO değeri 0,709 ve Barlett küresellik testi sonucu p<0,001), iç tutarlılığının (Cronbach alfa katsayısı 0,802) yeterli olduğu görülmüştür.*
Sonuç	*mYYBÖ 2.0 'yeme bağımlılığı' taramalarında veri toplama aracı olarak kullanılabilir.*
Anahtar Kelimeler	*Yeme Bağımlılığı; Geçerlilik; Güvenilirlik*

INTRODUCTION

We need nutrients to meet our physiological needs. Nutrients are known as natural rewards and affect the reward system in the limbic system. Vital natural rewards are defined as eating, drinking, sexuality, and social relationships.

In the preclinical studies, the homeostatic and non-homeostatic aspects of nutrition and their relationships with each other were evaluated. In a study, it was concluded that everyone would be at their ideal weight under conditions where nutrition is controlled only by homeostatic systems and that nutrition would be perceived as a vital need such as breathing. The hedonic system plays a role besides the reward system and its association with the sense of taste and pleasure. As a result, some nutrients are consumed excessively.[1,2]

When mentioned about addiction, at first, tobacco, alcohol, and substance addictions come to mind. However, behavior-based food addiction that is not based on a physical substance, gaming addiction, sex addiction, computer addiction, television addiction, shopping addiction, internet addiction can also be mentioned.[3,4] The inability to control behavior or action and the continuity of behavior or action despite its negative consequences can be shown as standard features for the concept of addiction both in substance addiction, such as alcohol and tobacco, and in behavioral addictions such as eating, sex, and internet.[5] Moreover, the dependence that occurs with these behaviors can cause activity changes in the anterior and limbic regions of the brain similar to that of substance dependence.[6-10]

Randolph first proposed the concept of food addiction (FA) in 1956, but it has become more emphasized with the spread of obesity in recent years.[11] In the 1990s, pioneers of FA, such as chocolate addiction, emerged in the literature. Although it was previously mentioned in popular media, in the early 2000s, they systematically began to be seen in the scientific literature. FA is considered as a valid further research topic for some individuals because of neurophysiological symptoms such as biobehavioral symptoms, the development of tolerance to certain foods, the presence of withdrawal symptoms, and the presence of endogenous opioids and dopamine activity in the midbrain FA is defined as a type of dependence in which some people over-consume certain foods, clinically leading to weight gain and obesity. However, is there a disorder that can be defined as food addiction? If there is such a disorder, the question of in which obesity or addiction-related disorders should the eating disorders be included has been raised.[12-16]

The debate continues in the literature, whether FA is a distinct phenomenon, a subtype of obesity, a qualifier for eating disorders, or a behavioral addiction.[17]

Although it is still debated that food is needed to survive unlike abused substances, and at what point it can be called addiction; the consumption of processed fat and carbohydrate-containing foods more than needed evokes the need for reward rather than the sense of saturation, and reinforces the concept of FA.[18] In some studies, it is believed that food addiction is the cause of many obesity cases. For example, a US survey found that food addiction is one of the most commonly used explanations for the cause of increasing obesity rates in Western society.

In the first half of the 20th century, chronic degenerative diseases came to the forefront after the infectious diseases that killed masses were kept under control. WHO reported that, in 2012, increased BMI was a risk factor for cardiovascular diseases, diabetes, and some cancers, one of the leading causes of death. The prevalence of obesity continues to rise in Turkey as a serious problem threatening the public health as around the world. According to TUIK (2016) data, the prevalence of obesity increased by 31.1% in 2014, from 15.2% in 2008 to 19.9%. In 2016, it was 19.6%. Although it is predicted that food addiction can cause obesity, it is not possible to say that the reason

for obesity is only food addiction. Understanding the extent of the relationship will only be possible through an appropriate assessment of food addiction.

Although there is no clarity in its definition, if FA is an addiction such as alcohol addiction, and if it confronts us with serious public health consequences related to obesity, we need to have information about the prevalence of this addiction and develop primary, secondary and tertiary protection strategies. To this end, Gearhardt and colleagues developed the Yale food addiction scale version 2.0 (YFAS version 2.0) in 2016.

There is no measurement tool developed for the diagnosis of FA in Turkish compatible with the recent changes in DSM-V. This study was conducted to adapt and test the validity and reliability of the modified Yale Food Addiction Scale Version 2.0 (mYFAS version 2.0), which is the short version of the test developed by Schulte and Gearhardt in 2017 to evaluate substance use disorder (SUD) criteria in FA.

MATERIAL and METHODS

This study is a methodological study conducted with 271 patients who admitted to 7 family medicine units affiliated to 3 Family Health Centers (ASM) in Sakarya province between June 2017 and March 2018 to test the validity reliability of the scale. Before starting the study, ethics approval was obtained from the Non-Interventional Research Ethics Committee of Sakarya University Faculty of Medicine (date: 02.10.2017; number: 71522473/050.01.04/200). Participants were selected from individuals between 18-65 years of age, who were mentally capable of understanding what they read or read to them, were not pregnant, not breastfeeding, had not undergone any gastrointestinal system surgery, and had no cancer.

Participation in the study was voluntary, and the scale was given to the participants and asked to mark the most appropriate option for them. For the retest, the participants were called one day in advance, invited to the ASM, and asked to complete the scale again. Height and weight measurements were carried out by the researcher with the measurement instruments included in the ASMs.

Modified Yale Food Addiction Scale Version 2.0 (mYFAS version 2.0)

Following the publication of DSM-V in 2013, the YFAS, which was formed based on the criteria in DSM IV, and its short version, the Modified YFAS, were out of date. Thereupon, in 2016 Gearhardt et al. developed the YFAS 2.0, which met the 11 SUD criteria in DSM V.[19] It was followed by modified YFAS 2.0 developed by Erica M. Schulte and Asley N. Gearhardt in 2017, to be used in extensive epidemiological studies, and in studies which addiction-like eating behavior must be determined with a short measurement.[20] mYFAS 2.0 is an 8-point Likert-type scale that consists of 13 items representing the behavioral findings experienced by the participant during the last year while eating certain foods (mainly processed foods). For scoring, with the suggestion of the author, each item was given a score of 0 or 1 based on the met criteria. (Table 1).

Table 1. Score Equivalent of Answers to 8-point Likert Scale Questions Asked to Participants

Questions	Answers	Score
Question 3, 7, 12, and 13		
	Answers 0-1 and 2	0
	Answers 3-4-5-6 and 7	1
Question 1,4,8, and 10		
	Answers 0-1-2-3 and 4	0
	Answers 5-6 and 7	1
Questions 2, 5, 6, 9 and 11		
	Answers 0-1-2-3-4 and 5	0
	Answers 6 and 7	1

A method was used in the evaluation of the scale, as in the original article.

SYMPTOM COUNT SCORING METHOD

It is calculated according to how many of the 13 items the

participant meets. The total score ranges from 0 to 13.

"Back-translation" method was used to translate the scale in the original language into Turkish, by translation from English to Turkish by three different people who are fluent in English and Turkish, and then the translation to English by two different people.[21,22] Finally, the language equivalence of the scale was obtained by consulting a different person to evaluate the meaning difference and make the necessary changes. The scale was presented to the expert group of six academics to ensure content validity, and the results were evaluated according to Davis technique.[23]

There are two basic psychometric properties (validity and reliability) in scale adaptation.[24] Validity is a concept evaluating if a test measures the property that it wants to measure. In this context, if a test measures the property, it wants to measure accurately, and without mixing it with other features, it is said to be valid. Reliability is the consistency of repetitions in a measurement process where similar results are obtained if the measurement is repeated.[25] The original mYFAS 2.0 scale was unidimensional (Table 2).[20]

Table 2. Methods Used in Validity Analysis

Method	Technique
Language validity	Group translation
	Back-translation
Content/Scope validity	Expert opinion (Davis Technique)
Suitability of sample size	Bartlett test
Suitability of data set for factor analysis	Kaiser-Meyer-Olkin test
Construct validity	Confirmatory factor analysis

Statistical Analysis

In the factor analysis, the sample size and its suitability for the factor analysis were performed with the Keiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and Bartlett's Sphericity test. KMO ranges from 0 to 1 and is required to approach 1, but above 0.60 is considered sufficient. Bartlett's Sphericity test is said to be appropriate for factor analysis when the p-value is less than 0.05, and attention should be paid to the principle of correlations being in between 0.30 and 0.90.17

The factor structure in the data was tried to be determined with the help of the variables observed in explanatory factor analysis. In the confirmatory factor analysis (CFA) tests, whether the theoretical structure determined by the researcher exists in the data is tested (Alpar 2016). Indices such as $\chi 2$, root mean square error of approximation (RMSA), comparative fit index (CFI), and goodness of fit index (GFI) were used in CFA. Cronbach Alpha Coefficient and KR-21 were used for internal consistency and homogeneity. Spearman correlation analysis and Wilcoxon signed-rank test were used for invariance of the scale against time.[17]

RESULTS

After the language validity of the scale was obtained, expert opinion was sought to evaluate the scope validity. The Davis value was ≥ 0.80, which was sufficient.

The validity of the scale

KMO value, showing the suitability of the scale for factor analysis, was found as 0.709. The Bartlett sphericity test result was p<0.001 (highly significant), and it was concluded that the sample size was sufficient. The single factor model in the original scale was evaluated by confirmatory factor analysis.

Confirmatory factor analysis

In the model, X^2 value was found 220,435, degree of freedom 63, p<0.001, x^2/Sd value 3,499, RMSEA 0.096, and CFI 0.850, showing that the scale was well fit. The factor loads are shown in Table 3.

Reliability analysis

The Cronbach's alpha coefficient calculated for the internal consistency analysis of the scale was 0.802. As a result of the item analysis of mYFAS 2.0, the total correlation values

Table 3. Reflection of substance use disorder criteria on items and factor loads

DSM-V SUD criteria	mYFAS 2.0 questions	Factor loads
Taking the substance in larger amounts or for longer than meant to.	I ate to the point where I felt physically ill (item 1)	0,48
Wanting to cut down or stop using the substance but not managing to	I tried and failed to cut down on or stop eating certain foods (item 11)	0,33
Spending a lot of time getting, using, or recovering from use of the substance	I spent much time feeling sluggish or tired from overeating (item 2)	0,58
Giving up important social, occupational, or recreational activities because of substance use	I avoided work, school, or social activities because I was afraid I would overeat there. (item 3)	0,14
Continue to use despite known negative consequences	I kept eating in the same way even though my eating caused emotional problems (item 8)	0,54
Tolerance	Eating the same amount of food did not give me as much enjoyment as it used to (item 9)	0,41
Development of withdrawal symptoms, which can be relieved by taking more of the substance	If I had emotional problems because I hadn't eaten certain foods, I would eat those foods to feel better (item 4)	0,27
Continued substance use despite having persistent or recurrent social or interpersonal problems	My friends or family were worried about how much I overate (item 13)	0,36
Substance use resulting in a failure to fulfill major role obligations	My overeating got in the way of me taking care of my family or doing household chores (item 7)	0,44
Substance use in situations in which it is physically hazardous.	I was so distracted by eating that I could have been hurt (e.g., when driving a car, crossing the street, operating machinery). (item 12)	0,32
Substance use causes clinically significant damage	I had significant problems in my life because of food and eating. These may have been problems with my daily routine, work, school, friends, family, or health (item 6)	0,93
Substance use causes clinically significant distress	My eating behavior caused me a lot of distress (item 5)	0,91

of the 3rd and 10th items were below 0.30. Therefore, it was decided not to remove these substances.

The invariance of the scale against time was evaluated over their total scores using test-retest with 32 participants in 15 days intervals. The Kolmogorov-Smirnov test evaluated the compatibility of the variables to the normal distribution, and nonparametric tests were applied. The Mann Whitney U test evaluated total scores, and no significant difference was found (p = 0.919). When the scores obtained were evaluated with Spearman correlation coefficient, a positive, very strong, and very significant correlation (r = 0.899; p <0.001) was found. These results showed that the scale did not change over time. As a result of these analyzes, the scale was adapted to Turkish successfully and named as 'modifiye edilmiş Yale yeme bağımlılığı ölçeği sürüm 2.0'.

Of the 271 participants, 205 were female (75.6%), and 66 were male (24.4%). The mean age was 39.2 ±12.66 SD, and the mean body mass index (BMI) was 29.249±6.183 SD.

Symptom count scoring methods was used to evaluate the participants and 0-13 points were obtained.

DISCUSSION

A negative, weak, significant correlation was found between addiction scores and age (r=0.15, p<0.05) in the study which YFAS developed, but in the original article of mYFAS 2.0 (r=0.13, p=0.06) (Schulte 2017) and in our study, no significant correlation was found between the scores obtained by the symptom counting scoring method

and age (r=0.15; p=0.802).

In our study, no significant difference was found between the genders in terms of symptom counting method, similar to the original article of mYFAS 2.0. This result shows us that if there is a problem, we need to address it as a whole without reducing it to the genders. Although there was no difference between the education levels in the original article in terms of the scores obtained from the scale, total symptom scores of university graduates were lower in our study. It is expected that more educated people will show this will on eating behavior and get a lower score, considering the desire of individuals to increase their education as a result of their will.

In this study, a specific sample selection method to represent the general population was not used since the patients included in the study were patients who applied to AHB. This situation could be considered as a limitation because the results could not be generalized, but the sample size was adequate and suitable for factor analysis. Besides, a scale that evaluates FA in a fast and practical way, which is an important and current problem in the world and Turkey, was adapted to Turkish with validity and reliability analysis. It increases the importance of the study.

There was a time when the risk of smoking was not understood, or it was assumed that smoking was beneficial. However, in the end, its damages were revealed through scientific studies. It is not a proven fact that a person may be addicted to food, but with a cautious approach, we believe that using these and similar scales will return to us as a gain rather than a loss due to the 'prudential principle.'

However, assuming that FA is a disease, the mYFAS 2.0 scale can be considered as an objective and practical tool that can lead us to diagnosis. Current data shows that Turkey will be struggling with obesity and related health problems in the future as today. Therefore, we think that it will be useful to adapt these and similar scales into Turkish for the prevention of obesity.

CONCLUSION

mYFAS 2.0 can be used as a data collection tool in 'food addiction' screenings. Considering that the concept of FA is still debatable, we think that the results obtained with the scale do not make the diagnosis of FA, but it can be a warning and a guide in research on obesity prevention.
In this study, It started with the approval of T.C. Sakarya University Faculty of Medicine Non-Invasive Research Ethics Committee dated 02/10/2017 and decision numbered 71522473/050.01.04/200.

Our article is published with any institution, organization and person. There is no conflict of interest and there is no conflict of interest between the authors.

Author contributions

Concept: ŞT; Supervision: HÇE; Materials: ŞT; Data Collection and/or Processing: ŞT; Analysis and/or Interpretation: ŞT, HÇE, EY; Writing: ŞT

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