

Evaluating the Validity and Reliability of the Feeding to Manage Child Behavior Questionnaire (FMCBQ) among Turkish Parents

Çocuk Davranışlarını Yönetmek için Besleme Anketi'nin (ÇDYBA) Türk Ebeveynlerde Geçerlik ve Güvenirliğinin Değerlendirilmesi

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ABSTRACT

Objective: This study aimed to evaluate the validity and reliability of the Turkish version of the Food to Manage Child Behavior Questionnaire (FMCBQ-T).

Materials and Methods: A total of 256 parents participated in the study, and the data were collected through a survey. Content validity was evaluated using the Content Validity Ratio (CVR) and the Content Validity Index (CVI). Construct validity was performed with Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA).

Results: The majority of parents were between the ages of 31-40 (56.3%) and female (83.9%). The CVR was 1 for each item, and the CVI was 1 for the scale. The Turkish version of the scale was determined to have three factors and nine items, with factor loadings ranging from 0.63-0.90. Cronbach's alpha coefficient was 0.84 for the total scale. CFA fit indices were found to be $\chi^2/df=1.63$, RMSEA=0.06, TLI=0.97, CFI=0.98, GFI=0.96, AGFI=0.92.

Conclusion: FMCBQ-T is a valid and reliable tool for Turkish parents. Since it is known that the feeding style in childhood affects later years of life, FMCBQ-T is necessary to evaluate how parents use food to manage their children.

Keywords: Child feeding, child behavior, food to soothe, food as reward

ÖZ

Amaç: Çocuk Davranışlarını Yönetmek İçin Besleme Anketi'nin (ÇDYBA-T) Türkçe geçerliliğini ve güvenilirliğini değerlendirmek amaçlanmıştır.

Materyal ve Metot: Çalışmaya toplam 256 ebeveyn katılmış ve veriler anket yoluyla toplanmıştır. Kapsam geçerliği, kapsam geçerlik indeksi (KGİ) ve içerik geçerlik oranı (KGO) ile değerlendirilmiştir. Yapı geçerliliği, açıklayıcı faktör analizi (AFA) ve doğrulayıcı faktör analizi (DFA) ile gerçekleştirilmiştir.

Bulgular: Ebeveynlerin çoğunluğu 31-40 yaş aralığında (%56,3) ve kadın (%83,9)'dı. KGO'nun her bir madde için 1, KGİ ise tüm ölçek için 1 olarak bulunmuştur. Ölçeğin Türkçe versiyonunun 3 faktör ve 9 maddeden oluştuğu belirlenmiştir. Faktör yükleri 0,63 ile 0,90 arasındadır. Cronbach' a katsayısının toplam ölçek için 0,84 olduğu bulunmuştur. DFA uyum indeksleri $\chi^2/sd =1,63$, RMSEA=0,06, TLI=0,97, CFI=0,98, GFI=0,96 ve AGFI=0,92 olarak bulunmuştur.

Sonuç: ÇDYBA-T, Türk ebeveynler için geçerli ve güvenilir bir araçtır. Çocukluktaki beslenme tarzının yaşamın sonraki yıllarını etkilediği bilindiğinden, ÇDYBA-T ebeveynlerin çocuklarını yönetmek için yiyecekleri nasıl kullandıklarını değerlendirmede oldukça gereklidir.

Anahtar Kelimeler: Çocuk beslenmesi, çocuk davranışı, ödül olarak yiyecek, yatıştırıcı yiyecek

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INTRODUCTION

Nutritional behaviors that begin in the family, especially through imitation of the mother, significantly shape the future nutritional behavior of children.¹ As these behaviors are known to be passed down to subsequent generations, teaching children proper nutritional behaviors is crucial.²

During childhood, when mood changes are frequent, food is often used as a tool to achieve the desired behavior. Different foods may be offered to children in order to correct the child's negative behavior or to reward correct behavior.³ Such interventions, which parents may also use to save time, are very effective in the emotional control of children.⁴

Food, snacks, or drinks can be offered to calm the child who becomes angry when the parent is busy or in public places.⁵ In particular, food-mediated reward practices, based on the parents' perceptions or expectations can facilitate the management of a child's behavior. However, it is not easy to determine in which situations these rewards, which do not have a direct nutritional purpose, are preferred.^{2,4,5}

In relation to the information given above, a tool titled "The Feeding to Manage Child Behavior Questionnaire (FMCBQ)" was developed by Savage et al. to determine situations in which child behavior

is managed through feeding reward.⁶ In this study, it was aimed to adapt the FMCBQ in the Turkish language and to determine its validity and reliability among Turkish parents.

MATERIALS AND METHODS

Ethical Considerations: The study was conducted in accordance with the Declaration of Helsinki, and all procedures were approved by the Akdeniz University Faculty of Medicine Ethics Committee (Date: 20.07.2022, decision no: KAEK-482). Informed consent was obtained from all subjects.

Research Design and Sampling: This study was conducted in public kindergartens in Antalya, Türkiye, between April to August 2022. The sample consisted of parents with children aged between 2-6 years who volunteered to participate in the study. Parents whose children used medications that affect appetite or had any chronic disease were excluded (Figure 1). In adaptation studies, it is recommended that the approximate sample size be at least 5-10 times the number of scale items (between $9 \times 5 = 45$ and $9 \times 10 = 90$).⁷ However, if the number of items in the scale is low, a minimum sample of 200 participants is considered more appropriate.^{8,9} This study was completed with a total of 256 parents, meeting the sample requirements in the literature.

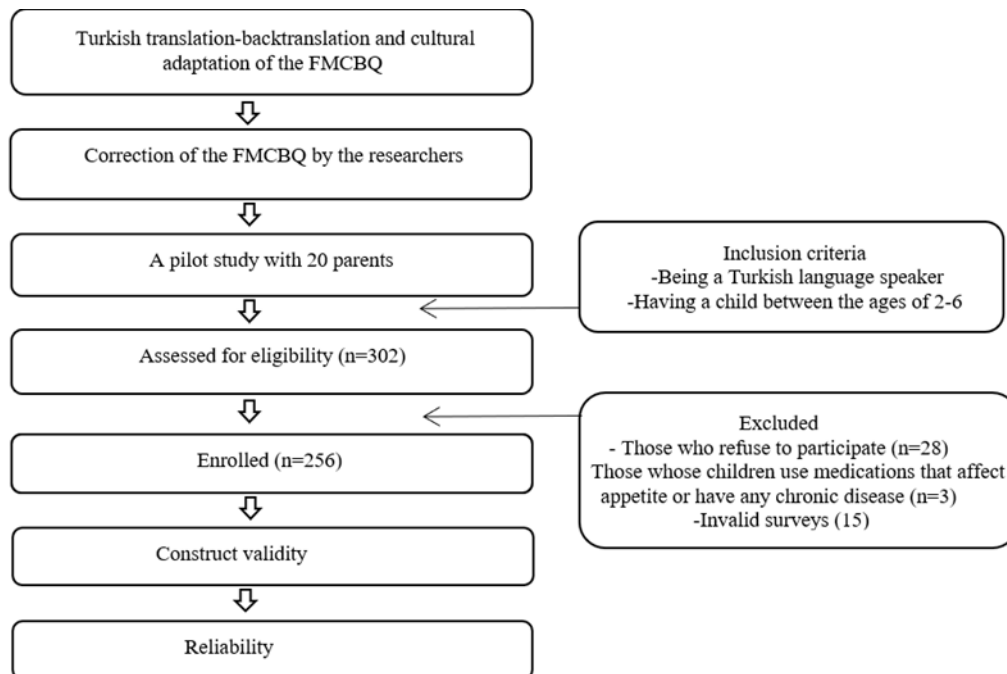


Figure 1. Flowchart of the study.

Data Collection: Study data were collected by contacting parents through kindergarten teachers. Before the study began, parents were provided with necessary information and a survey form. The first part of the form included socio-demographic information, while the second part consisted of FMCBQ items.

Body weight and height were measured using a scale and a non-stretchable tape, following standard procedures. Parents' BMI was calculated by dividing body weight by the square of height in meters (kg/m²) (WHO).¹⁰ Children's BMI-for-ages were calculated using the WHO Anthro-Plus program.¹¹ All BMI values were classified based on WHO criteria.^{10,11}

Original Version of the Feeding to Manage Child Behavior Questionnaire (FMCBQ): Before the study, the necessary permission was obtained via e-mail from the developers of the questionnaire. The FMCBQ originally comprises two factors and nine items (5-point Likert scale). Each item is scored from 0 to 4 points (0 = Never, 1 = Rarely, 2 = Sometimes, 3 = Often, 4 = Always). The average score of each factor is calculated by dividing the total score by the number of items, ranging from 0 to 4 points. Unanswered items are excluded from scoring.⁶

The Food to Soothe (FTS) factor assesses the frequency of using food to prevent negative reactions or to keep children calm. It includes five items (1, 4, 5, 8, 9). The Food as Reward (FAR) factor evaluates the frequency of using food to reward children's behavior or food consumption and includes four items (2, 3, 6, 7).⁶

Turkish Translation and Adaptation Procedure: The translation-back-translation method was used for the Turkish adaptation process. In the first stage, the scale was translated from English to Turkish by individuals fluent in both languages, including two experts in English Language and Literature and five experts in Nutrition and Dietetics. The resulting draft was reviewed by five Nutrition and Dietetics experts for semantic integrity, consistency, and grammatical accuracy. After the evaluation, necessary corrections were made, and a pilot test was conducted with a sample of 20 parents. Based on the pilot test results, it was determined that each item was understandable, appropriate, and the total response time was approximately five minutes.

Content Validity and Construct Validity: Content validity calculations were made using the Lawshe Technique.¹² Content Validity Ratio (CVR) and Content Validity Index (CVI) were calculated based on the opinions of five experts. Before conducting Exploratory Factor Analysis (EFA), the adequacy of the sample size was evaluated using the Kaiser-Meyer-Olkin (KMO) test. Bartlett's test of sphericity was applied to assess the multivariate normal distribution assumption.¹³

assumption.¹³

To determine the theoretical structure, the Varimax rotation method was used to maximize the factor loadings of the items as much as possible.¹⁴ The theoretical structure was tested using CFA. Fit indices, including χ^2/sd , RMSEA, TLI, CFI, GFI, and AGFI, were calculated using the maximum likelihood method.¹⁵

Reliability analysis was evaluated using the split-half method, Cronbach's alpha coefficient, Hotelling's T² test, and Tukey's test. In the split-half method, the scale was randomly divided into two parts, and the relationship between them was evaluated using the Spearman-Brown test.¹⁶

Statistical Analysis: SPSS and AMOS software were used for data analysis. During the validity assessment, EFA was conducted to determine the theoretical structure, with the varimax rotation method applied to maximize item factor loadings. The verification of the theoretical structure was tested with CFA. In the CFA, the fit of the model was evaluated with the χ^2/df , RMSEA, AGFI, GFI, CFI, and TLI.¹⁵ During the reliability assessment, the internal consistency of the scale was tested with Cronbach's alpha coefficient and the split-half method. The scale's unbiasedness was assessed with Hotelling's T² test, and its additivity was examined using Tukey's test. The statistical significance level for the analyses was set at $p < 0.05$.

RESULTS

A total of 256 parents participated in the study. The majority were aged 31-40 years (56.3%), female (83.9%) and university graduates (48.8%). Approximately 97.6% of the participants were married, and 46.1% had one child. According to BMI classification, 59.0% of parents and 50% of children were classified as normal (Table 1).

The FMCBQ originally comprises nine items and two factors. However, as a result of the factor analysis, a three-factor structure with eigenvalues greater than one was determined, and the scree plot confirmed the existence of the factors. The cumulative variance value was calculated as 70.9% for the three factors. The FTS factor included five items (1, 4, 5, 8, 9), consistent with the original scale. However, the FAR factor is split into two separate factors, each comprising two items. The new factors were submitted for evaluation to five academicians for naming. Based on their consensus, the second factor was named "Food as a behavior reward (FBR)" (items 2 and 3), and the third factor was named "Food as an eating reward (FER)" (items 6 and 7). Factor loadings ranged from 0.63 to 0.90, with no overlapping items. In its final form, the scale was confirmed to have nine items and three factors. Each factor exhibited summability.

Cronbach's alpha coefficient was found to be 0.84 for all items, 0.88 for the FTS factor, 0.68 for the FBR factor, and 0.86 for the FER factor. CVR and CVI were calculated using the Lawshe Technique. The CVR was found to be 1.0 for each item, while

the CVI was found to be 1.0 for the entire scale. The KMO test for sampling adequacy yielded a value of 0.88. Bartlett's test of sphericity was statistically significant ($p < 0.05$) (Table 2).

Table 1. Demographic information.

		n (%)
Age	18-30	78 (30.4)
	31-40	144 (56.3)
	41 +	34 (13.3)
Gender	Woman	215 (83.9)
	Man	41 (16.1)
Education	Primary school	10 (3.9)
	High school	41 (16.1)
	University	125 (48.8)
	Master+	80 (31.2)
Marital status	Married	250 (97.6)
	Single	6 (2.4)
Number of children	1	118 (46.1)
	2	112 (43.8)
	3 +	26 (10.1)
BMI (kg/m2)	Underweight	5 (2.0)
	Normal	151 (59.0)
	Overweight	81 (31.5)
	Obese	19 (7.5)

Table 2. Explanatory factor and internal consistency analysis results of the FMCBQ-T.

Items	Food to soothe	Food as behavior reward	Food as eating reward	Total scale
(1) I give snacks or drinks as a way to distract and keep my child quiet when my child is acting out (ex: throwing a tantrum, whining, etc.)	0.70			0.57
(2) I give snacks or drinks as a way to distract and keep my child quiet when my child is sad or upset	0.76			0.67
(3) I give snacks or drinks as a way to distract and keep my child quiet when we are in public settings (ex, church/mosque, shopping, doctor's office, theatre, etc.)	0.70			0.64
(4) I give snacks or drinks to distract or keep my child quiet when I am feeling frustrated, stressed, or tired	0.70			0.71
(5) I give snacks or drinks to distract or keep my child busy when I am trying to get something done at home (example: on the phone, cleaning the house, preparing dinner, getting dressed, etc.)	0.81			0.66
(6) I offer my child his/her favorite foods as a reward for good behavior		0.63		0.62
(8) I withhold sweets/desserts from my child in response to bad behavior		0.90		0.82
(7) I offer my child a "treat" or "dessert" to get my child to eat his/her vegetables			0.88	0.85
(9) I offer my child a "treat" or "dessert" for eating everything on his/her plate			0.90	0.85
Eigenvalue	4.18	1.19	1.00	
Variance explanation (%)	46.44	13.26	11.20	70.90
Cronbach's α coefficient	0.88	0.68	0.86	0.84
CVI (entire scale)				1.0
CVR (each item)	1.0	1.0	1.0	
KMO				0.88
Bartlett's test of sphericity				<0.05

The fit index (χ^2/df) was found to be 1.63, and the RMSEA value was 0.06. Other CFA fit indices were found to be TLI = 0.97, CFI = 0.98, GFI = 0.96, AGFI = 0.92. Using the split-half method, the scale was divided into two parts, and the correlation between them was 0.76. The scale was found to be unbiased by Hotelling's T^2 test ($p < 0.05$). The Tukey test result for the scale was found to be significant ($p < 0.05$) (Table 3).

Factor loadings of the scale items vary between 0.44 and 0.93. All standardized path coefficients of this

model were found to be more than 0.4. The items with the lowest and highest factor loadings were identified within the FBR factor (Figure 2).

DISCUSSION AND CONCLUSION

Parents, who play a primary role in their child's nutrition, may use food as a reward to save time or encourage specific behaviors. Foods can also be used as a calming tool to ease children's challenging hospital experiences.^{2,5} FMCBQ, developed by Savage et al.⁶ is a valuable tool for identifying how and

Table 3. The fit statistics of the FMCBQ-T according to confirmatory factor analysis.

Fit statistic	Value	Criteria ¹⁵
χ^2/df	1.63	<5
RMSEA	0.06	<0.08
TLI	0.97	>0.90
CFI	0.98	>0.90
GFI	0.96	>0.90
AGFI	0.92	>0.90
Split-half correlation coefficient	0.76	
Hotelling's T^2 test	$p < 0.05$	
Tukey test	$p < 0.05$	

RMSEA: root mean square error of approximation; TLI: Tucker-Lewis index; CFI: comparative fit index; GFI: goodness of fit index; AGFI: adjusted goodness of fit index.

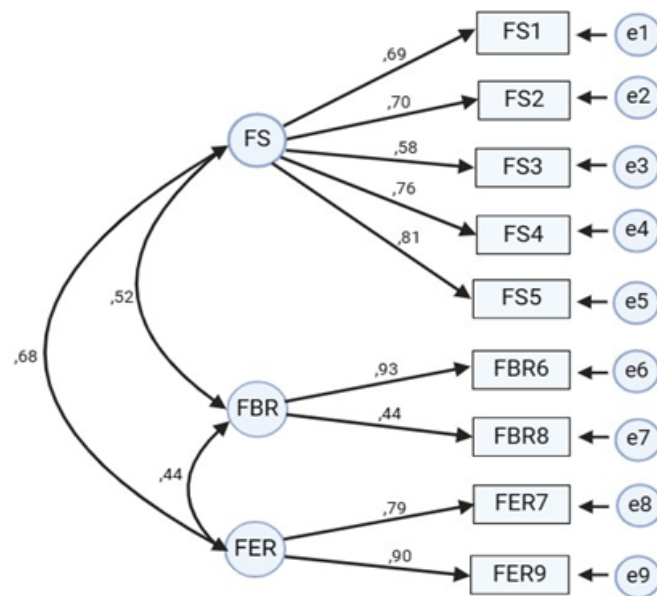


Figure 2. Confirmatory factor analysis diagram of the FMCBQ-T. FS: Food to soothe; FBR: Food as behavior reward; FER: Food as eating reward.

in which situations child behaviors are managed through food. Therefore, adapting FMCBQ into Turkish will meet an important need. This study was conducted with parents to test the Turkish version of FMCBQ and to evaluate its validity and reliability of FMCBQ-T.

CVR and CVI values were found to be 1, and the construct validity of FMCBQ-T was evaluated by five experts in the field of Nutrition and Dietetics.¹³ Accordingly, experts confirmed that the scale accurately reflected its intended content. In this study, the KMO value was 0.88, and Bartlett's test of sphericity was found to be statistically significant ($p < 0.05$). Therefore, the multivariate normal distribution assumption and factor analysis criteria were met.¹⁷ The sample size was determined based on the guidelines outlined in the methods section, ensuring a sufficient number of parents were included.^{7,8} FMCBQ-T was administered to a total of 256 parents.

EFA was performed to create the theoretical structure of the tool.¹⁴ The original FMCBQ includes nine items and two factors, consisting of FTS and FAR.⁶ However, in this study, factor analysis resulted in the nine items loading onto three distinct factors. The item loadings for the FTS factor were consistent with the original scale. In contrast, the four items of the FAR factor split into two separate factors, each with two items, rather than loading onto a single factor as in the original scale. The increase in the number of factors was reviewed by five experts, who determined that the FAR factor items assess rewards for specific behaviors or eating. Consequently, the three-factor structure was deemed more appropriate for the model.

Examination of the FAR factor items reveals that rewards are given for specific behaviors or eating. Thus, it is expected that this factor might split during the adaptation process. The outcome may also stem from cultural differences. In Turkish culture, it is a common practice from early childhood to use food as a reward for certain behaviors or adequate food intake, both among healthy children and children with autism, in whom eating behavior problems are frequently observed.¹⁸⁻²⁰ Additionally, semantic differences during the adaptation process and characteristics of the sample may also contribute to factor changes. In adaptation studies, equivalents in the target language can evoke different associations. Consequently, the FAR factor was divided into two factors, FBR and FER.

All factor loadings exceeded 0.40, the reference value in the literature.¹⁷ According to EFA, the factors explain 70.9% of the total structure, and this value was above the minimum reference value of 50.0%.²¹ Consequently, the three-factor structure of the FMCBQ-T effectively explained the theoretical

model.^{17,21} Similar to this study, other studies assessing parents' attitudes toward child feeding and obesity risk used scales that separately evaluate behavioral and nutritional factors.²²⁻²⁴

In adaptation studies, it is recommended to verify the theoretical model derived from EFA using CFA. Path coefficients in CFA should exceed 0.4.¹⁵ In this study, the path coefficients for the items ranged from 0.44 to 0.93, indicating highly satisfactory results.⁷ All CFA fit indices ($\chi^2/df = 1$, RMSEA=0.06, TLI=0.97, CFI=0.98, GFI=0.96 and AGFI=0.92) met the required criteria.¹⁵ The adapted scale's fit indices outperformed those of the original version (RMSEA =0.12, GFI =0.90, CFI =0.88).⁶

The internal consistency of the FMCBQ-T was assessed using Cronbach's alpha coefficients. Cronbach's alpha coefficient between 0.60 and 0.80 indicates that the scale is reliable.²⁵ In this study, the Cronbach's alpha coefficients for the FTS, FBR and FER factors were 0.88, 0.68, and 0.86, respectively, and the coefficient for the entire scale was 0.84. In the original version, Cronbach's alpha coefficients were 0.84 for the FTS factor and 0.70 for the FAR factor.⁶ In another study evaluating parents' feeding behaviors using the FMCBQ, Cronbach's alpha coefficients were 0.87 for the FTS factor and 0.72 for the FAR factor.²⁶

A significant positive relationship was found between the FTS factor and child BMI ($p < 0.05$). Given that increased BMI is associated with higher food consumption, it is expected that children given more food for soothing purposes may have a higher BMI. Several studies have indicated that the frequent use of food to soothe children in early childhood is associated with obesogenic eating behaviors in later childhood and exerts long-term effects on dietary habits and weight status.²⁷⁻³⁰ Although parents use foods to soothe children for various reasons, this practice represents a major risk factor for childhood obesity.

This study has some limitations. Most participants were women, which was anticipated given that women tend to be more involved in child feeding than men. To minimize participation bias, the survey was distributed to both mothers and fathers, however, mothers provided the majority of responses. This may reflect mothers' primary role in child feeding within families or fathers' relative disengagement from these responsibilities. Future studies could address this limitation by implementing strategies to enhance father participation, such as targeted sampling through father-focused groups or social media platforms appealing to male parents. Additionally, the study was conducted in a single city, so the results may not be representative of the broader population. Future research should include more diverse geographic areas, a more balanced gender distribu-

tion, and larger sample sizes to improve generalizability.

In conclusion, this study demonstrated that the FMCBQ-T is a valid and reliable tool for Turkish parents. Due to cultural differences and feeding practices, the original two-factor scale was loaded onto three factors during the adaptation process. The adapted version, which distinguishes between behavioral and eating components, is better suited for the Turkish population. Given that childhood feeding practices influence later life, FMCBQ-T is an essential tool for assessing how parents use food to manage their children's behavior. Future studies should involve larger and more diverse regions and include greater father participation to evaluate further the use of food in managing children's behavior.

Ethics Committee Approval: The study was conducted in accordance with the Declaration of Helsinki, and all procedures were approved by the Akdeniz University Faculty of Medicine Ethics Committee (Date: 20.07.2022, decision no: KAEK-482).

Conflict of Interest: No conflict of interest was declared by the authors.

Author Contributions: Concept; MY, Supervision; MY-UOY; Materials; MY-OUY; Data Collection; MY-OUY; Analysis and/or Interpretation; MY-UOY, Writing: MY-UOY.

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