

The Evaluation of Oral Feeding in Preterm Infants: Turkish Validation of the Early Feeding Skills Assessment Tool

Burcu Aykanat Girgin¹, Duygu Gözen², Rabia Uslubaş³, Leyla Bilgin³

¹Department of Pediatric Nursing, University of Health Sciences Hamidiye Faculty of Nursing, Istanbul, Turkey

²Department of Pediatric Nursing, Istanbul University- Cerrahpasa Florence Nightingale Faculty of Nursing, Istanbul, Turkey

³Neonatal Intensive Care Unit, Ümraniye Training and Research Hospital, Istanbul, Turkey

What is already known on this topic?

- Competence in oral feeding is the main requisite for discharging preterm infants from intensive care.
- To ensure the safe and successful transition to oral feeding, preterm infants' feeding skills should be assessed using an objective, infant-oriented method.
- There is currently no instrument with tested validity and reliability available to evaluate the oral feeding skills and readiness of preterm infants in Turkey.

What this study adds on this topic?

- The EFS-Turkish is a valid and reliable instrument that can be applied in the NICU to assess preterm infants' feeding skills during the transition to oral feeding.
- The use of the EFS-Turkish is recommended to facilitate the safe and successful development of preterm infants' oral feeding skills and plan evidence-based initiatives.

Corresponding author:

Duygu Gözen

duygugozen@gmail.com

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ABSTRACT

Objective: The Early Feeding Skills Assessment Tool (EFS) is a valid and reliable tool for evaluating preterm infants' oral feeding skills and readiness during the transition to oral feeding. There is currently no instrument with tested validity and reliability available to evaluate the oral feeding skills and readiness of preterm infants in Turkey. The aim of this study was to fill the need for such an instrument for use in the Turkish population by adapting and validating the EFS for the assessment of Turkish preterm infants during the transition to oral feeding.

Material and Methods: This methodological, cross-sectional study included 107 preterm infants. Validity of the EFS-Turkish was tested with linguistic, content, and construct validity analyses, and its reliability was tested using internal consistency and item analyses.

Results: A panel of experts confirmed the content validity of the items in the EFS-Turkish (content validity index = 0.97). Cronbach's alpha for the total instrument was 0.95, supporting its internal consistency reliability. Item-total correlations ranged from 0.58 to 0.83 ($P < .001$). Confirmatory factor analysis confirmed the established EFS structure of 19 items and 5 factors. The tool demonstrated good model fit statistics ($\chi^2/df = 2.24$; $P < .001$).

Conclusion: The EFS-Turkish is a valid and reliable instrument for use in neonatal intensive care units to evaluate the feeding skills of preterm infants during the transition to oral feeding. The use of the EFS-Turkish is recommended to facilitate the safe and successful development of preterm infants' oral feeding skills and to plan evidence-based initiatives.

Keywords: Infant feeding, feeding skills, preterm infant, validity

INTRODUCTION

In preterm infants, oral feeding is a dynamic process involving complex interactions between the oral-motor, neurological, cardiorespiratory, and gastrointestinal systems.^{1,2} Preterm infants experience difficulty feeding due to physiological and neurological immaturity.³⁻⁵ Inadequate feeding skills in the preterm infant lead to delayed discharge, increased cost of care,^{3,6} and in the long term, cause feeding issues to become chronic, resulting in growth and developmental problems.⁷ Therefore, encouraging the development of preterm infants' feeding skills and preventing potential feeding problems in the early period is the most important approach to fostering their growth and development.^{8,9}

Competence in oral feeding is the main requisite for discharging preterm infants from intensive care.¹⁰ To ensure the safe and successful transition to oral feeding, preterm infants' feeding skills should be assessed using an objective, infant-oriented method.^{9,11} The neonatal nurse must perform a comprehensive assessment of oral feeding behavior with the knowledge

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that this dynamic process emerges as a result of the interaction between the oral-motor, neurological, cardiorespiratory, and gastrointestinal systems.¹² Parameters used in the clinical assessment of oral feeding skills in the preterm infant include the volume of food prescribed, the amount of food taken, duration of feeding, volume of food taken per minute, and the ratio of the volume taken in the first 5 minutes of feeding to the total volume taken.^{13,14} These assessments provide nurses with objective measurements of changes in the infant's feeding skills, but have limited value in determining the cause of problems experienced during feeding and the transition process.⁹

The oral feeding skills of preterm infants should be evaluated by a multidisciplinary team using a valid and reliable assessment tool.^{8,9,15} The literature includes various tools developed and used for this assessment.^{11,15,16} These assessment tools are important in the categorization of preterm infants' oral-motor functions, observation of sucking functions and development,^{16,17} and evaluation of readiness for oral feeding, oral feeding skills, and stability during feeding.^{11,15} However, these tools were reported to be insufficient to determine feeding interventions targeting areas in which preterm infants have problems or require additional support.⁹

The Early Feeding Skills Assessment Tool (EFS) is a valid and reliable tool to comprehensively evaluate skills that contribute to safe and successful oral feeding in preterm infants, in 5 subdimensions of respiratory regulation, oral-motor function, swallowing coordination, engagement, and physiologic stability. It facilitates the planning of feeding interventions to improve preterm infants' skills in problem areas during the transition to oral feeding, compared to other available instruments to assess feeding skills.⁹ It is necessary that neonatal nurses evaluate the feeding skills of preterm infants during transition to oral feeding and plan and implement feeding interventions to improve preterm infants' skills in problem areas to minimize any feeding disorder.^{9,15} There is currently no instrument with tested validity and reliability available to evaluate the oral feeding skills and readiness of preterm infants in Turkey. Therefore, the aim of this study was to fill the need for such an instrument for use in the Turkish population, by adapting and validating the EFS for the assessment of Turkish preterm infants during the transition to oral feeding.

METHODS

Design and Setting

This methodological study was conducted in a research hospital in Istanbul. Preterm infants treated in the 60-bed neonatal intensive care unit (NICU) of the hospital between March 2019 and January 2020 were included.

Sample

A sample size at least 5 times that of the number of items in a scale is recommended to perform factor analysis in validity and reliability studies.^{18,19} It is also recommended that validity and reliability studies include 100-250 subjects.²⁰ Therefore, we determined that a minimum sample of 95 subjects was necessary for the 19-item EFS, then increased the target to 107 subjects to allow for possible exclusions or incomplete data. Power analysis was performed using the GPower (v 3.1.7) program to determine the necessary sample size. Post-hoc analysis

revealed that the power of a sample size of 107 preterm infants with $\alpha = 0.05$ and effect size (w) = 0.30 was $1 - \beta = 0.87$. The power of 0.80 or higher indicated an adequate sample size.²¹

Preterm infants born at a gestational age of 24 to 36⁺⁶ weeks based on the last menstrual period and were in the process of transitioning to oral feeding from orogastric catheter feeding were included. All infants in the study had tolerated $\geq 50\%$ of their prescribed volume of milk for 2 consecutive days and exhibited readiness for oral feeding as defined in the cue-based feeding approach. These readiness criteria included tolerance of full enteral feeding, stable respiration and oxygen saturation while feeding, responsiveness to perioral/oral stimulation, and showing alertness with behaviors such as licking, nuzzling, and nonnutritive sucking.^{22,23} Exclusion criteria included genetic and neurological disorders (e.g., Down syndrome, short bowel syndrome, omphalocele, periventricular leukomalacia, intracranial hemorrhage, hydrocephaly) and craniofacial abnormalities (e.g., cleft palate/lip, facial paralysis). Parents of all the infants voluntarily participated in the study and provided written informed consent.

Instruments

Preterm Infant Descriptive Information Form

Data regarding the infant's gestational age and weight at birth, sex, the reason for NICU admission, postmenstrual age and weight at the time of the study, and any oxygen support received were recorded on this form.

Early Feeding Skills Assessment Tool (EFS)

The original EFS was developed by Thoyre, Shaker, and Pridham in 2005 to evaluate the feeding skills of preterm/term infants during the transition to oral feeding, and originally comprised 22 items in 4 subscales.²⁴ In 2018, the instrument was revised by Thoyre et al.⁹ in terms of the scoring method and validity and reliability analyses. Thoyre et al.⁹ revised the original EFS and performed construct validity, internal consistency, and item analyses to evaluate the validity and reliability of the instrument. Principal components analysis with varimax rotation supported a 5-factor structure and item factor loadings ranged from 0.37 to 0.79. Cronbach's alpha for the total EFS was 0.81. Mean inter-item correlations of the items in each subscale were calculated to assess internal consistency of the subscales. The resulting values (0.28-0.47) were all within the acceptable range (0.15-0.50). During analysis, the developers removed 3 items from the EFS, resulting in the final total of 19 items in 5 subscales.⁹ The current study examines the validity of the Turkish version of the revised EFS.

No changes to the item content, number of items, or scoring procedure were made while adapting the revised EFS to Turkish. Both the revised EFS⁹ and Turkish version of the EFS contain 19 items in 5 subscales: respiratory regulation, oral-motor function, swallowing coordination, engagement, and physiologic stability. The tool allows the evaluation of preterm infants' readiness for oral feeding and oral feeding skills, as well as the observation of symptoms associated with problematic feeding and planning of feeding interventions targeting areas in which the infant experiences difficulty or requires support during the transition to oral feeding. Therefore, the tool includes 2 types of items: (1) items that evaluate the development of oral

feeding skills and (2) items that describe observable indicators of a problem during feeding. Items related to feeding skills are evaluated using the following 3-option structure: skill not yet observed (1 point), skill emerging (2 points), and skill consistently observed (3 points), with minor variations in wording depending on the item. Indicators of problems within a skill are scored using a frequency-based 3-option structure: frequent indication of problem (1 point), occasional indication of problem (2 points), and never or rare indication of a problem (3 points), and again, the specific wording varies by item.⁹

The respiratory regulation subscale (items 1-5) assesses the preterm infant's competence and difficulties in coordinating respiratory function during feeding. Scores for respiratory regulation range from 5 to 15. The oral-motor function subscale (items 6-9) assesses the infant's ability to organize oral-motor functions. Scores for oral-motor function range from 4 to 12. The swallowing coordination subscale (items 10-13) assesses the preterm infant's ability and difficulties in coordinating the swallowing function while feeding. Scores range from 4 to 12. The engagement subscale includes items 14 and 15, which are related to the infant's active participation in feeding, and yields a total score between 2 and 6. The physiologic stability subscale (items 16-19) assesses to what degree the infant can maintain physiologic stability while feeding, and the preterm infant's difficulties in this area. Scores for physiologic stability range from 4 to 12. The overall EFS score is the sum of the 5 subscale scores and ranges from 19 to 57. Higher scores indicate more mature feeding skills.⁹

Two example items from the scale are explained in the following examples. For instance, from the respiratory regulation subscale the item "each time the nipple is received, transitions to sucking without behavioral or cardiorespiratory instability" is scored as consistently stable (3 points), instability for at least one transition (2 points), and instability for most or all transitions (1 point) in assessment. For instance, from the physiologic stability subscale the "stable heart rate" item is scored as remains close to pre-feeding level (3 points), occasional rise or dip 20% above or below pre-feeding (2 points), and frequent rises or dips 20% above or below pre-feeding (1 point) (www.feedingflock.com).

Data Collection

The Preterm Infant Descriptive Information Form was completed by the researchers for each preterm infant based on their medical records. The infants were observed for 30 minutes before feeding. The feed was initiated when the infants exhibited the readiness cues described in the sample section above.^{22,23,25} All infants were fed with a bottle while held in a semi-elevated side-lying position as described in our previous study.²⁶ All infants were fed by the same nurse to avoid the influence of multiple nurses' different feeding techniques. The nurse who fed the infants was a PhD student in pediatric nursing with a master's degree in pediatric nursing and a bachelor of science degree in nursing. She had over 5 years of experience in the NICU, had completed the NICU Nursing Certification Program (66 hours of theory courses and 120 hours of practice), and was certificated by the Ministry of Health. She also participated in the Preterm and Term Infants' Feeding symposium (parenteral-enteral and oral feeding) and

completed a "Transition to Oral Feeding in Preterm Infants" education program. A single feeding of each infant was scored separately and independently based on the observations of 3 healthcare personnel who are specialists in their field and assess infant feeding skills within their professional work. The first and second observers were specialist nurses with over 10 years of experience caring for preterm infants in the NICU. The third observer was the NICU head neonatologist. A total of 107 independent feedings and 321 independent feeding scores (107 independent feeding × 3 observers) were evaluated using the EFS-Turkish. All infants were positioned on their right sides immediately after the feed in order to facilitate venting and gastric emptying.²⁷

Data Analysis

The data were analyzed using Statistical Package for the Social Sciences (SPSS) version 20.0 (IBM SPSS Corp.; Armonk, NY, USA). Confirmatory factor analysis (CFA) was performed using the LISREL software package.¹⁸ Descriptive statistics were calculated for all variables.

To ensure linguistic validity of the EFS for the Turkish-speaking population, the translation/back-translation method was used to translate from English to Turkish, and an expert panel evaluated the content validity of the Turkish version.²⁸ Each item was rated from 0 to 4 (irrelevant to highly relevant), and a content validity index (CVI) was determined for each item using the following formula: (number of experts who rated the item 3 or 4 points)/number of experts on the panel.²⁹

The internal consistency reliability of the Turkish-EFS was evaluated using Cronbach's alpha coefficient and item-total, subscale item-subscale total, and subscale-total correlations.^{18,30,31} In item correlation analyses, Cronbach's alpha values of >0.70 and *r* values >0.20 were accepted.^{18,32} Inter-rater reliability between the 3 observers was assessed using inter-class correlation coefficient (ICC), with ICC values >0.75 considered excellent reliability.³³

Construct validity was evaluated by CFA.^{18,19,34} Methods used to assess fit included chi-square to degrees of freedom ratio (χ^2/df), root mean square error of approximation (RMSEA), goodness-of-fit index (GFI), comparative fit index (CFI), incremental fit index (IFI), normed fit index (NFI), and non-normed fit index (NNFI).^{19,34} Pearson correlation analysis was performed to evaluate relationships between EFS total and subscale scores and the preterm infants' gestational age at birth.^{9,19}

Ethical Considerations

Written consent to perform the adaptation and validity/reliability studies of the tool was obtained from one of the developers of the instrument.⁹ The study was conducted in concordance with the Declaration of Helsinki-Ethical Principles for Medical Research Involving Human Subjects. Ethical and institutional approval to conduct this study was obtained from the institutional review board of Umraniye Training and Research Hospital (March 20, 2019/48). All parents of the included infants were informed about the nature and purpose of the study, and provided oral and written consent.

Table 1. Sociodemographic and Clinical Features of the Preterm Infants (n = 107)

Age and Weight	X ± SD*	Min–Max
Gestational age at birth (weeks)	31.77 ± 2.96	24.14–36.14
Postmenstrual age at study (weeks)	35.84 ± 1.50	32.71–43.14
Birth weight (g)	1572 ± 467.5	550–2680
Body weight (g)	2037.3 ± 281.5	1490–2760
Sex	N	%
Female	60	56.1
Male	47	43.9
Medical diagnosis**		
Respiratory distress	53	49.5
Respiratory distress syndrome	38	35.5
Bronchopulmonary dysplasia	13	12.1
Intrauterine growth restriction	7	6.5
Patent ductus arteriosus	8	7.5
Hypothyroidism	4	3.7
Transient tachypnea of the newborn	4	3.7
Sepsis	3	2.8
Pneumonia	2	1.9

*Values given are mean ± standard deviation (SD); **A preterm infant could be admitted to the intensive care unit with multiple diagnoses. Row percentages were taken.

RESULTS

Sample Characteristics

The 107 preterm infants in this study included 56.1% (n = 60) females and 43.9% (n = 47) males. The infants’ clinical features are presented in Table 1. The mean gestational age at birth was 31.77 ± 2.96 weeks and the mean postmenstrual age at the time of the study was 35.84 ± 1.50 weeks. The preterm infants’ mean birthweight was 1572 ± 467.5 g and their mean weight at the time of the study was 2037.3 ± 281.5 g. The medical diagnoses were respiratory distress in 49.5% (n = 53), respiratory distress syndrome in 35.5% (n = 38), and bronchopulmonary dysplasia in 12.1% (n = 13).

Descriptive Statistics of the EFS-Turkish

Mean scores in the 5 subscales of the EFS-Turkish were 11.40 ± 2.67 (min–max, 5–15) for respiratory regulation, 10.00 ± 1.88 (min–max, 5–12) for oral–motor function, 10.84 ± 1.71 (min–max, 4–12) for swallowing coordination, 4.58 ± 1.19 (min–max, 2–6) for engagement, and 9.58 ± 2.46 (min–max, 4–12) for physiologic stability. The mean total EFS-Turkish score was 46.40 ± 8.68 (min–max, 22–57).

Content Validity of the EFS-Turkish

The EFS was first translated into Turkish by the researchers, followed by 2 native Turkish speakers fluent in English and familiar with both cultures. These translations were evaluated to create a single Turkish version of the instrument. Some words and sentences were changed at this stage to improve the meaning and appropriateness of the language. The Turkish version of the scale was then translated back into English by an independent translator, whose mother tongue is English and who had

not seen the original version. The original and back-translated versions were compared by the researchers and developers of the original EFS, and no further changes were deemed necessary. A panel of 8 specialists in neonatal feeding was invited to analyze the content validity of the EFS-Turkish items. The resulting CVI values for the individual items ranged from 0.87 to 1.00, and the CVI for the entire EFS was 0.97.

Construct Validity of the EFS-Turkish

Construct validity was evaluated using CFA based on the 5 factors of the original EFS. According to this analysis, χ^2/df was 2.24, RMSEA was 0.018, GFI was 0.91, CFI was 0.96, IFI was 0.96, NFI was 0.94, and NNFI was 0.96. CFA results corroborated the 5-factor structure of the assessment tool. CFA factor loadings for the EFS-Turkish subscales varied between 0.68 and 0.93. Factor loadings of the subscales were 0.76–0.81 for respiratory regulation, 0.69–0.83 for oral–motor function, 0.68–0.82 for swallowing coordination, 0.82–0.92 for engagement, and 0.84–0.93 for physiologic stability. Figure 1 shows the factor loadings of the subscales. Statistics demonstrated good model fit. The items’ regression and t values are shown in Table 2. The t values for significance of the regression coefficients of the EFS-Turkish items varied between 7.65 and 12.57 and were above 1.96 for all items (Table 2).

We also examined construct validity by comparing EFS scores with gestational age, expecting to observe an association between later gestational age and higher overall EFS score. Gestational age at birth was positively and significantly

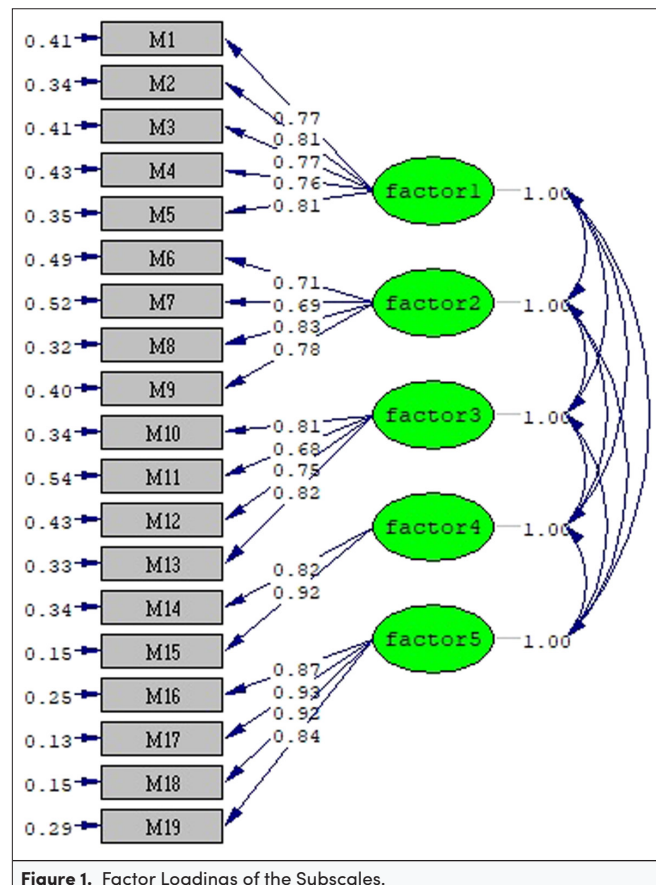


Figure 1. Factor Loadings of the Subscales.

Table 2. Regression and *t* Values of the Items in the EFS-Turkish (*n* = 107)

Item	Regression Value	<i>t</i> -value*
Item 1	0.77	9.24
Item 2	0.81	9.97
Item 3	0.77	9.24
Item 4	0.76	8.99
Item 5	0.81	9.92
Item 6	0.71	8.18
Item 7	0.69	7.85
Item 8	0.83	10.15
Item 9	0.78	9.23
Item 10	0.81	9.81
Item 11	0.68	7.65
Item 12	0.75	8.81
Item 13	0.82	9.92
Item 14	0.82	9.24
Item 15	0.92	10.79
Item 16	0.87	11.13
Item 17	0.93	12.57
Item 18	0.92	12.40
Item 19	0.84	10.64

**t*-values of significance for regression coefficients of the scale items in confirmatory factor analysis; *t*-values of the items in the EFS-Turkish were >1.96 and statistically significant (*P* < .001).

correlated with respiratory regulation (*r* = 0.576, *P* = .000), oral-motor function (*r* = 0.517, *P* = .000), swallowing coordination (*r* = 0.652, *P* = .000), engagement (*r* = 0.400, *P* = .000), and physiologic stability (*r* = 0.632, *P* = .000) subscale scores, and EFS total scores (*r* = 0.662, *P* = .000). There was a significant association between later gestational age and higher EFS total and subscale scores (*P* < .05).

Reliability of the EFS-Turkish

Item-total score correlations ranged from 0.58 to 0.83 (*P* < .001). Subscale-total score correlations ranged from 0.70 to 0.93, demonstrating significant positive correlations (*P* < .001). Subscale item-subscale total score correlations ranged between 0.79 and 0.94 (*P* < .001). Cronbach’s alpha values for the EFS-Turkish subscales ranged from 0.79 to 0.94 and that of the entire scale was 0.95 (Table 3).

Inter-rater reliability between the 3 observers was assessed with ICC. For EFS-Turkish total score, the ICC among the 3 observers was 0.99 (*P* = .0001). ICC values for the EFS-Turkish subscales were 0.98 for respiratory regulation, 0.97 for oral-motor function, 0.93 for swallowing coordination, 0.96 for engagement, and 0.99 for physiologic stability (*P* = .0001).

DISCUSSION

In this study, we demonstrated the validity and reliability of the Turkish version of the EFS. The content validity of the Turkish-EFS was confirmed by a panel of 8 health professionals who were knowledgeable about neonatal feeding and had extensive professional and research experience with preterm infants’ oral feeding. The CVI of the EFS-Turkish was 0.97, well above the accepted threshold of 0.80.²⁹

Table 3. Subscale Item-Subscale Total Score Correlations and Subscale Cronbach’s Alpha values of the EFS-Turkish (*n* = 107)

Subscales of EFS-Turkish	EFS-Turkish Items	<i>r</i>	<i>P</i>	Cronbach’s Alpha
Respiratory regulation	Item 1	0.82	.000	0.79
	Item 2	0.87	.000	
	Item 3	0.84	.000	
	Item 4	0.79	.000	
	Item 5	0.83	.000	
Oral-motor functioning	Item 6	0.84	.000	0.83
	Item 7	0.81	.000	
	Item 8	0.82	.000	
	Item 9	0.84	.000	
Swallowing coordination	Item 10	0.85	.000	0.84
	Item 11	0.80	.000	
	Item 12	0.83	.000	
Engagement	Item 13	0.84	.000	0.86
	Item 14	0.94	.000*	
Physiologic stability	Item 15	0.93	.000*	0.94
	Item 16	0.90	.000*	
	Item 17	0.94	.000*	
	Item 18	0.94	.000*	
	Item 19	0.89	.000*	

r, Pearson correlation analysis; **P* < .001.

CFA is a method of construct validity analysis that can be used during cross-cultural adaptation of assessment tools to confirm an established factor structure.^{18,35}

Model fit index values accepted as indicators of excellent and acceptable fit are <3 and 4 to 5 for χ^2/df ; 0 to 0.05 and 0.05 to 0.08 for RMSEA; 0.97 to 1 and 0.95 to 0.97 for both CFI and NNFI; and 0.95 to 1 and 0.90 to 0.95 for both GFI and NFI, respectively.^{19,34,36} Based on these values, our CFA of the EFS-Turkish indicated excellent (χ^2/df , RMSEA) to acceptable (GFI, CFI, NFI, NNFI) fit. The EFS-Turkish was found to be compatible with the structure of the original 19-item, 5-factor EFS.

Factor loads represent correlations between a scale’s items and its factors, and are considered when determining which items to remove from a scale.³⁷ Factor loads over 0.40 are expected.^{19,35,37} In the present study, all item factor loads were positive and over 0.40 (Figure 1). Therefore, no items were removed. In addition, the regression coefficients and *t* values of the items were assessed for significance (*t* > 1.96) in the CFA.^{37,38} The *t* values greater than 1.96 are expected in CFA to demonstrate significance of the regression coefficients. Items with a *t* value less than 1.96 are considered insignificant and their removal from the instrument is recommended.³⁷ In our study, *t* values for all EFS-Turkish items were >1.96. This analysis demonstrated that the regression coefficients and *t* values for all items of the EFS-Turkish were significant (*t* > 1.96, *P* < .001; Table 2). Therefore, no items were removed again.

In the literature, lower gestational age at birth was shown to correlate with prolonged transition to full oral feeding in preterm infants,^{5,9} and transition to full oral feeding is recognized

as an indicator of the development of feeding skills in preterm infants.³⁹ In light of this information, in the EFS validity and reliability study, Thoyre et al.⁹ also investigated the correlation between infants' gestational age at birth and EFS subscale and total scores in their evaluation of construct validity, in addition to factor analysis. They detected a correlation between older gestational age of preterm infants and higher scores in the EFS respiratory regulation and physiologic stability subscales as well as EFS total scores.⁹ Consistent with the literature and our expectations, we observed that later gestational age was correlated with higher EFS total score in our study. We also observed significant positive correlations between later gestational age at birth and higher scores in the respiratory regulation, oral-motor function, swallowing coordination, engagement, and physiologic stability subscales. In contrast to the study by Thoyre et al.,⁹ the correlations with all EFS subscales observed in our study may be attributable to the difference in sample groups. While our sample included only preterm infants (min-max, 24.14-36.14 weeks, Table 1), Thoyre et al.⁹ (2018) included both preterm and term infants in their study (min-max, 23.3-41.2 weeks).

Cronbach's alpha coefficient is used to evaluate the internal consistency reliability of an instrument. The lower acceptable limit for Cronbach's alpha is considered 0.70,^{32,40} while a value between 0.80 and 1.00 is accepted as an indicator of high reliability.⁴¹ Cronbach's alpha for the EFS-Turkish was 0.95, indicating that it is highly reliable, while those for the subscales ranged between 0.79 and 0.94 (Table 3). This demonstrates consistency of the items and high reliability of the EFS-Turkish,^{19,42,43} consistent with data reported for the original EFS, which had a Cronbach's alpha of 0.81.⁹ We believe the difference in sample groups affected the reliability results obtained in our study.

Item analysis is another method used to determine an instrument's reliability. Also known as item reliability, this method assesses each item in terms of its contribution to the overall score and its correlation with the instrument.³⁷ According to the literature, item-total score correlations should be over 0.30.⁴² Item-total correlations in the present study ranged between 0.58 and 0.83 and were over 0.30. Consistent with our results, Thoyre et al.⁹ reported mean inter-item correlations for the 5 subscales ranging from 0.28 to 0.47.

For EFS-Turkish total score and EFS-Turkish subscales, the ICC among the 3 independent observers was >0.75, indicating excellent reliability.³³

In conclusion, the EFS-Turkish is a valid and reliable instrument that can be applied in the NICU to assess preterm infants' feeding skills during the transition to oral feeding. Moreover, the EFS-Turkish enables the organization of feeding interventions in problem areas during this transition. Therefore, the use of the EFS-Turkish is recommended to facilitate the safe and successful development of preterm infants' oral feeding skills and to plan evidence-based initiatives. Although we evaluated the feeding skills of preterm infants with the EFS-Turkish, this instrument can also be used for the assessment of infants up to 50 weeks of postmenstrual age.

Ethical Committee Approval: Ethical committee approval was received from the Clinical Ethics Committee of Umraniye Training and Research Hospital (March 20, 2019/48).

Informed Consent: Written informed consent was obtained from all participants who participated in this study or their parents.

Peer-review: Externally peer-reviewed.

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Conflict of Interest: The authors have no conflicts of interest to declare.

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