FOOD AND NUTRITION IN COLLECTIVE HEALTH
DOI: 10.12957/demetra.2026.87303

DEMETRA
Alimentação, Nutrição & Saúde
e-ISSN:2238-913X

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Reliability and structural validity of the parental feeding style questionnaire adapted for Brazilian preschool children

Confiabilidade e validade estrutural do questionário de estilo parental de alimentação adaptado para pré-escolares brasileiros

Abstract

The study aimed to evaluate of the reliability and structural validity of the Brazilian version of the Parental Feeding Style Questionnaire (PFSQ).Parents/guardians of 269children between 4-5 years old completed the translated and culturally adapted PSFQ. Subscale Cronbach's alpha examined internal consistency, and exploratory and confirmatory factor analyses were applied to assess the structural validity of the questionnaire. Cronbach's alpha of subscales ranged from 0.63 to 0.78, and the overall consistency was good (alpha=0.73). Confirmatory factor analysis indicated that a four-factor model was valid to asses feeding parental style after the rearrangement of 22 out of the 27 questions in the original questionnaire into four dimensions denominated: (a) instrumental and emotional feeding; (b) prompting or encouragement to eat; (c) control over eating; and (d) permissive feeding. The psychometric evaluation of the PFSQ determined the proposition of a new version with fewer questions to characterize parental feeding styles.

Keywords: Children feeding practices. Questionnaires. Validation studies. Psychometrics. Factor analysis.

Resumo

O objetivo do estudo foi avaliar a confiabilidade e a validade estrutural da versão brasileira do Questionário de Estilo Parental de Alimentação – QEPA (*Parental Feeding Style Questionnaire* - PFSQ). Pais/responsáveis de 269 crianças entre 4 e 5 anos de idade preencheram o PSFQ traduzido e adaptado culturalmente. O alfa de Cronbach foi aplicado para examinar a consistência interna das subescalas e análises fatoriais exploratórias e confirmatórias foram desenvolvidas para avaliar a validade estrutural do instrumento. O alfa de Cronbach variou entre 0,63 e 0,78 sendo a consistência global considerada boa (α: 0,73). A análise fatorial confirmatória indicou um modelo de quatro fatores como válido para avaliar o estilo parental de alimentação após a reorganização de 22 das

27 perguntas do questionário original em quatro dimensões: (a) alimentação instrumental e emocional; (b) estímulo ou encorajamento para comer; (c) controle sobre a alimentação; e (d) alimentação permissiva. A avaliação psicométrica do QEPA determinou a proposição de uma versão com um número reduzido de questões para caracterizar os estilos parentais de alimentação.

Palavras-chave: Práticas de alimentação infantil. Questionários. Estudos de validação. Psicometria. Análise factorial.

INTRODUCTION

Shaping eating habits is one of the responsibilities of the family regarding an individual's upbringing, especially in the early stages of life, such as preschool years, which is a decisive period for a child's development and the formation of food preferences. Just like their eating choices, the emotions and the behavior of parents/guardians influence children's eating habits.[1]

The way parents interact with their children is denominated parenting style. This concept was first defined by Darling and Steinberg[2] as a group of behaviors directed at and communicated to children, creating an emotional state in which the parent's behavior pattern is expressed.[2] This behavior pattern is usually characterized by two dimensions: demandingness (control exerted by the parents) and responsiveness (acceptance and receptivity to a child's necessities).[3] Parental feeding style is considered a subcategory of parenting style that addresses the subject of eating habits,[4] in which the same dimensions of demand and responsiveness are applied.[4-6]

The characterization of parental feeding style and the assessment of its influence on children's eating habits, nutritional condition, and health have been carried out in various countries, requiring valid and reliable measurement tools.[7] The Caregiver's Feeding Style Questionnaire has been proposed by Hughes et al.[5] in the United States, to characterize the feeding style of caregivers of children between the ages of 3 and 5 years old. This instrument consists of 38 questions and classifies feeding styles into four types: authoritative, authoritarian, indulgent, and uninvolved. Cauduro, Reppold, and Pacheco[8] translated and adapted this questionnaire to the Brazilian context. The authors tested the applicability of this instrument in a pilot study with 14 parents of children between 2 and 7 years old and pointed out the need to evaluate its content, construct, and criterion validity.

In Australia, a32-question Parent Feeding Dimension Questionnaire was elaborated to characterize the parenting feeding style according to four dimensions, two of them subdivided into subscales: (a) support (including the subscales acceptance and autonomy support), (b) structure, (c) coerciveness (including the subscales rejection and coercion), and (d) chaos. The instrument was administered to230 caregivers of children aged 4 to 8 years old. The study found that the parental feeding style might have a role in the children's BMI.[9]

The Parental Feeding Style Questionnaire was developed by Wardle et al.[10] in England to characterize the feeding style of mothers of children between 3-5 years old and evaluate the differences in feeding styles of mothers with obesity and those with adequate weight. The PFSQ includes four dimensions: (a) emotional feeding, the use of food as a response to children's emotional distress, for example, offering food to comfort upset children; (b) instrumental feeding, use food as a reward for good behavior; (c) prompting or encouragement to eat, when parents praise children if they eat what is offered; and (d) control over eating, when parents regulate the timing and amount of the child food intake, especially regarding snacks and sweets.

The translated and culturally adapted version of the PFSQ was used in the present study. This questionnaire was selected as it is concise, developed for preschoolers' parents/guardians, and covers different aspects of parents' behavior towards the children's food intake, especially those related to emotional feeding. Therefore, the objective of this study is to evaluate the reliability and structural validity of the Brazilian adapted version of PFSQ.

METHODS

Study design and population, and data collection

This is a cross-sectional secondary analysis of the baseline data obtained in the study "Expansion of Preschoolers Feeding Universe: an Intervention study", conducted in 2018. The study population was comprised of children between 4-5 years old (n=383 were eligible) enrolled in two public schools in Rio de Janeiro, Brazil. The schools were selected by convenience. Parents/guardians answered a multi-thematic questionnaire via in-person interviews. The instrument encompassed questions about the parental feeding style and socioeconomic and demographic information of the children and parents/guardians.

Parental feeding style questionnaire

The original PFSQ consists of 27 items that assess behaviors related to the parental feeding style. Respondents indicate the frequency of each behavior using a five-point Likert scale, ranging from never (1 point) to always (5 points). The questions are distributed across four dimensions as follows: (a) emotional feeding (5 items); (b) instrumental feeding (4 items); (c) prompting or encouragement to eat (8 items); and (d) control over eating(10 items). To characterize the parental feeding style, the mean score is estimated for each dimension is calculated by summing the points and dividing by the number of questions. The highest average within the four scales indicates the parents' predominant feeding style evaluated by the instrument.[10]

The process of translation and cross-cultural adaptation of the PFSQ followed the procedures recommended by Borsa, Damásio, and Bandeira.[11] First, the instrument was translated independently by two researchers from the field of nutrition. The two versions were then compared regarding the aspects of semantic, concept, linguistic, and context to be synthesized into a single version. This version was then submitted to a panel of experts in nutrition, gastronomy, and psychology who analyzed the questionnaire's appropriateness to the Brazilian cultural context and suggested modifications to improve vocabulary accessibility and make it understandable for the targeted public. Subsequently, the questionnaire was back-translated into English by an independent translator. The equivalence of the Brazilian adapted version was checked and approved by comparing the back-translated version with the original questionnaire. The Portuguese version was submitted to a pre-test with 20 parents/guardians of 4 — 5 year-old children. After the pre-test, the questionnaire was deemed easy to understand and required no further modifications.

Statistical Analysis

For the characterization of the children evaluated, the continuous variables were described using means and standard deviations, and the categorical variables by proportions (%).

Endorsement frequencies were calculated for all questions of the PFSQ. For items i1 to i22, it corresponded to the proportion of respondents who answered "always", "often, "sometimes", or "rarely". For items i23 to i27, it corresponded to the proportion of respondents who answered "often", "sometimes", "rarely", or "never".

Internal consistency was evaluated by Cronbach's alpha coefficient and a one-sided 95% lower confidence limit. This analysis was conducted for both the original version of the instrument[10] and the final model. Cronbach's alpha values greater than 0.70 are considered satisfactory.[12]

The structural analysis of the PFSQ contemplated four stages. The first stage consisted of reevaluating the four-factor model of the 27-item questionnaire using a confirmatory factor analysis (CFA).[13] In this stage,

were estimated the Modification Indices (MI) (Univariate Lagrange Multiplier) and the Expected Parameter Changes (EPC)[13,14] as interim diagnoses to assess the presence of possible anomalies, and the limit of ≥0,20 indicated a violation for both parameters. We also assessed the magnitude of factor correlations, setting the cut-off point of >0.80 as moderate and >0.85 as high suspicion of violating the discriminant factor validity.[13]

In the second stage, an exploratory approach was established to identify a more parsimonious structural configuration, using the principal component analysis (PCA) to estimate the eigenvalues. Factors with eigenvalues greater than 1.0 were evaluated using an Exploratory Structural Equation Model (ESEM) to check the existence of cross-loading (assessing factor item ambiguity), low factor loading (assessing low informative items), and possible residual correlations (assessing content redundancy). Geomin oblique rotation was used in this stage.[13]

Based on the ESEM results, in the third stage, the two greatest factor loadings for each item were identified. Items were retained if they met two criteria: (1) a primary factor loading greater than 0.35 and (2) the absence of factorial ambiguity, defined as a difference of at least 0.20 between the two highest loadings. The ESEM was re-run iteratively after each removal with the remaining items, and the same criteria were applied successively. This iterative process continued until all remaining items exhibited sufficiently strong and distinct factor loadings, ensuring the exclusion of items with low or cross-loadings.

The fourth stage consisted of a confirmatory factor analysis (CFA) conducted on the model emerging from step 3. Items with loadings ≥0.4were treated as admissible.[15] Moreover, the MI, EPCs, and the magnitude of factor correlation were also evaluated.

All factor analyses were performed in Mplus 8.3.[16] The analyses used probit models on polychoric correlation matrices, using the robust diagonally weighted least squares estimator (weighted least squares mean and variance - WLSMV). This estimator also allows the accommodation of missing data.[17] Model fit was evaluated by Root Mean Square Error Approximation (RMSEA), Comparative Fit Index (CFI), and Tucker-Lewis Index (TLI). RMSEA compensates for the effect of the model's complexity by estimating the fit considering the number of parameters involved (degrees of freedom). Values <0.06 suggest a good fit, and values >0.10 indicate an inadequate fit, advising the model's rejection.[13] Upper confidence limits (UCL) of 90% were also considered.[13] CFI and TLI compare the target model with a null model. CFI and TLI vary from 0 to 1, and values between 0.90 and 0.95 indicate an acceptable fit.[13]

Ethics aspects

This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving human subjects were approved by the Research Ethics Committee of the Federal University of Rio de Janeiro (CAAE 85829518.2.0000.5257). Written informed consent was obtained from all subjects.

RESULTS

From the 383 eligible children, 269 (70%) received parental consent to take part in the study. Most children (70%) were over 5 years old (mean=5.4 yo), 54% were male, and 63% had an adequate weight. Two-thirds of parents/guardians were over 30 years old, 77% lived with a spouse, and 61% had completed at least eight years of schooling (Table 1).

Table 1. Distribution of preschool children (4 to 5 years and 11 months old; n=269) from public schools and parents/guardians enrolled in a nutrition intervention study according to demographic and anthropometric characteristics. Rio de Janeiro, Brazil, 2018.

Characteristics	n	%
Children		
Sex		
Female	123	46
Male	146	54
Age		
4 – 4 years and 11 months old	81	30
5 – 5 years and 11 months old	188	70
Weight status		
Normal weight	168	63
Overweight	86	32
No information	15	6
Parents/guardians		
Age (years old)		
<30	90	34
≥ 30	177	66
No information	2	0,7
Marital status		
Married	206	77
Single or divorced	62	23
No information	1	0,3
Schooling (years of study)		
<8	36	13
≥8	164	61
No information	68	25

Table 2 shows the PFSQ items according to the originally proposed dimensions and Cronbach's alpha coefficients estimated by Wardle et al.[10] The Cronbach's alpha coefficient for the culturally adapted questionnaire reached the following values across the four dimensions: instrumental feeding (0.63), emotional feeding (0.78), prompting or encouragement to eat (0.76), and control over eating (0.66). The proportion of endorsement for each item is also presented in Table 2, ranging from 23,8% (item 9 "I give my child something to eat to make him/her feel better when s/he is feeling angry") and 97,8% (item 27 "I let my child decide when s/he would like to have her meal").

Table 2. Internal consistency of the Parental Feeding Style Questionnaire (PFSQ), culturally adapted for the Brazilian context, and endorsement frequencies of the items. Preschool children (4 to 5 years and 11 months old; n=269). Rio de Janeiro, Brazil, 2018.

Dimension	Item		Scale's α coefficient*	Endorsement frequencies **
Instrumental feeding	i1	*In order to get my child to behave him/herself I promise him/her something to eat*	0.63 (0.57)	64.7
	i2	*If my child misbehaves I withhold his/her favorite food*		50.9
	i3	*I use sweets as a bribe to get my child to eat his/her main course*		58.4
	i4	*I reward my child with something to eat when s/he is well behaved*		70.3
Emotional feeding	i5	*I give my child something to eat to make him/her feel better when s/he is feeling upset*	0.78 (0.74)	52.8
	i6	*I give my child something to eat to make him/her feel better when s/he has been hurt*		50.2
	i7	*I give my child something to eat if s/he is feeling bored*		42.8
	i8	*I give my child something to eat to make him/her feel better when s/he is worried*		33.5
	i9	*I give my child something to eat to make him/her feel better when s/he is feeling angry*		23.8
Prompting or encouragement to eat	i10	*I encourage my child to look forward to the meal*	0.76 (0.71)	90.3
	i11	*I praise my child if s/he eats what I give him/her*		97.4
	i12	*I encourage my child to eat a wide variety of foods*		94.8
	i13	*I present food in an attractive way to my child*		89.2
	i14	*I encourage my child to taste each of the foods I serve at mealtimes*		94.1
	i15	*I encourage my child to try foods that s/he hasn't tasted before*		96.7
	i16	*I encourage my child to enjoy his/her food*		92.6
	i17	*I praise my child if s/he eats a new food*		96.7
Control over eating	i18	*I decide when it is time for my child to have a snack*	0.66 (0.60)	93.3
	i19	*I decide how many snacks my child should have*		92.9
	i20	*I decide what my child eats between meals*		91.5
	i21	*I decide the times when my child eats his/her meals*		96.7
	i22	*I insist my child eats meals at the table*		93.3
	i23	*I allow my child to choose which foods to have for meals*		91.1
	i24	*I allow my child to wander around during a meal*		97.4

Table 2. Internal consistency of the Parental Feeding Style Questionnaire (PFSQ), culturally adapted for the Brazilian context, and endorsement frequencies of the items. Preschool children (4 to 5 years and 11 months old; n=269). Rio de Janeiro, Brazil, 2018. .(Continues)

Dimension	Item		Scale's α coefficient*	Endorsement frequencies **
	i25	*I allow my child to decide when s/he has had enough snacks to eat*		88.5
	i26	*I let my child eat between meals whenever s/he wants*		94.8
	i27	*I let my child decide when s/he would like to have her meal*		97.8

* In brackets: 95% lower confidence limit.
** Endorsement frequencies i1-i22: proportion of respondents who responded 'always', 'often', 'sometimes' or 'rarely'. Endorsement frequencies i23-i27: proportion of respondents who responded 'often', 'sometimes', 'rarely' or 'never'.

Table 3 summarizes the CFA results regarding the initially evaluated four-factor model. Regarding the model adjustments, the RMSEA index was 0.54 and can be considered satisfactory; nevertheless, the CFI and TLI presented values <0.90, indicating inadequate adjustment. Loadings ranged from 0.11 to 0.86 and seven items presented loadings <0.40. Eight items presented residuals (δ_i) above 0.70. Only two MI with standardized EPC were ≥0.20, and no factor correlations exceeded 0.80,as factor correlations ranged between -0.028 and 0.662 (data not shown).

Table 3. Analysis of the dimensional structure of the Parental Feeding Style Questionnaire (PFSQ), culturally adapted for the Brazilian context, using confirmatory factor analysis. Preschool children (4 to 5 years and 11 months old; n=269). Rio de Janeiro, Brazil, 2018.

Dimension	Item		Model: 4-factor CFA				
			$\lambda_{i(1)}$ [a]	$\lambda_{i(2)}$	$\lambda_{i(3)}$	$\lambda_{i(4)}$	δ_i [b]
	i1	*In order to get my child to behave him/herself I promise him/her something to eat*	.66				.57
Instrumental	i2	*If my child misbehaves I withhold his/her favorite food*	.28				.92
feeding	i3	*I use sweets as a bribe to get my child to eat his/her main course*	.60				.65
	i4	*I reward my child with something to eat when s/he is well behaved*	.59				.22

Table 3. Analysis of the dimensional structure of the Parental Feeding Style Questionnaire (PFSQ), culturally adapted for the Brazilian context, using confirmatory factor analysis. Preschool children (4 to 5 years and 11 months old; n=269). Rio de Janeiro, Brazil, 2018.(Continues)

Dimension	Item		Model: 4-factor CFA				
			$\lambda_{i(1)}$ [a]	$\lambda_{i(2)}$	$\lambda_{i(3)}$	$\lambda_{i(4)}$	δ_i [b]
Emotional feeding	i5	*I give my child something to eat to make him/her feel better when s/he is feeling upset*		.68			.55
	i6	*I give my child something to eat to make him/her feel better when s/he has been hurt*		.76			.42
	i7	*I give my child something to eat if s/he is feeling bored*		.81			.34
	i8	*I give my child something to eat to make him/her feel better when s/he is worried*		.82			.32
	i9	*I give my child something to eat to make him/her feel better when s/he is feeling angry*		.70			.51
Prompting or encouragement to eat	i10	*I encourage my child to look forward to the meal*			.59		.65
	i11	*I praise my child if s/he eats what I give him/her*			.66		.57
	i12	*I encourage my child to eat a wide variety of foods*			.72		.49
	i13	*I present food in an attractive way to my child*			.63		.60
	i14	*I encourage my child to taste each of the foods I serve at mealtimes*			.65		.57
	i15	*I encourage my child to try foods that s/he hasn't tasted before*			.62		.62
	i16	*I encourage my child to enjoy his/her food*			.63		.61
	i17	*I praise my child if s/he eats a new food*			.61		.62

Table 3. Analysis of the dimensional structure of the Parental Feeding Style Questionnaire (PFSQ), culturally adapted for the Brazilian context, using confirmatory factor analysis. Preschool children (4 to 5 years and 11 months old; n=269). Rio de Janeiro, Brazil, 2018.(Continues)

Dimension	Item		Model: 4-factor CFA				
			$\lambda_{i(1)}$ [a]	$\lambda_{i(2)}$	$\lambda_{i(3)}$	$\lambda_{i(4)}$	δ_i [b]
Control over eating	i18	*I decide when it is time for my child to have a snack*				.84	.29
	i19	*I decide how many snacks my child should have*				.86	.27
	i20	*I decide what my child eats between meals*				.67	.56
	i21	*I decide the times when my child eats his/her meals*				.53	.72
	i22	*I insist my child eats meals at the table*				.33	.89
	i23	*I allow my child to choose which foods to have for meals*				.11	.99
	i24	*I allow my child to wander around during a meal*				.34	.88
	i25	*I allow my child to decide when s/he has had enough snacks to eat*				.38	.86
	i26	*I let my child eat between meals whenever s/he wants*				.32	.90
	i27	*I let my child decide when s/he would like to have her meal*				.18	.97
		Modification index					
		i10 ON AI / AI BY i10			22.286		
		i10 ON AA / AA BY i10			32.512		
		RMSEA [c]			.054 (.047;.061)		
		CFI [d]			.891		
		TLI [e]			.880		

[a] Factor loadings (standardized). [b] Measurement errors (uniqueness). [c] Root Mean Square Error of Approximation; in brackets: 90% confidence intervals. [d] Comparative Fit Index. [e] Tucker-Lewis Index

Exploratory analyses were conducted based on the results of the previous stage. The preliminary PCA indicated 7 eigenvalues above 1.0. ESEM with five, six, and seven factors were tested; in one case there was one factor with only four items, while two other solutions presented considerable cross-loadings and/or very low loadings (<0.35). Given these limitations and drawing on theoretical considerations grounded in the literature — which supported a more coherent and conceptually plausible organization of items within four distinct dimensions — the ESEM solution with four factors was selected. The ESEM results of this model are presented in Table 4.

Despite having four factors, the structural configuration proposed in the ESEM was different from that proposed in the original instrument. It was observed that items i1 to i4 (instrumental feeding) and items i5 to i9 (emotional feeding) were grouped into a single factor. Items i10 to i17 (prompting or encouragement to eat) stayed in the dimension proposed originally. Items i18 to i27 (control over eating) got split into two factors: one comprising items related to parental control (i18 to i22) and the other reflecting parental permissive behaviors (i23 to i27). MI and EPC values also indicated that modifications in the proposed original structure were required (Table 4).

Based on the established criteria, items i2, i10, i12, and i22 were excluded. Items i2 and i22 were removed due to low factor loadings (<0.35)and items i10 and i12 were eliminated due to cross-loadings, i.e., the two highest loadings had a difference <0.20. Regarding the model adjustments, the RMSEA index was 0.50 and can be considered satisfactory, as well as the CFI (0.93) and the TLI (approximately 0.90) (Table 4). Following the exclusion of items i2, i10, i12, and i22, item i23 was removed as well, given its low factor loading (λ: 0.397; data not shown).

Table 4. Analysis of the dimensional structure of the Parental Feeding Style Questionnaire (PFSQ), culturally adapted for the Brazilian context, using exploratory structural equation models. Preschool children (4 to 5 years and 11 months old; n=269). Rio de Janeiro, Brazil, 2018.

Item		Model: 4-factor ESEM				
		$\lambda_{i(1)}$ [a]	$\lambda_{i(2)}$	$\lambda_{i(3)}$	$\lambda_{i(4)}$	δ_i [b]
i1	*In order to get my child to behave him/herself I promise him/her something to eat*	.55	.05	-.08	.05	.68
i2	*If my child misbehaves I withhold his/her favorite food*	.21	.04	-.03	-.02	.95
i3	*I use sweets as a bribe to get my child to eat his/her main course*	.50	.06	-.15	.08	.71
i4	*I reward my child with something to eat when s/he is well behaved*	.67	.18	-.09	.27	.43
i5	*I give my child something to eat to make him/her feel better when s/he is feeling upset*	.65	.02	.04	.06	.58
i6	*I give my child something to eat to make him/her feel better when s/he has been hurt*	.73	.05	-.05	.00	.45
i7	*I give my child something to eat if s/he is feeling bored*	.77	.02	.07	-.09	.37
i8	*I give my child something to eat to make him/her feel better when s/he is worried*	.84	-.10	.20	-.08	.29
i9	*I give my child something to eat to make him/her feel better when s/he is feeling angry*	.74	-.08	.04	.05	.50
i10	*I encourage my child to look forward to the meal*	.30	.43	.04	-.10	.63
i11	*I praise my child if s/he eats what I give him/her*	.05	.68	-.03	-.02	.53
i12	*I encourage my child to eat a wide variety of foods*	.04	.57	.34	-.12	.45
i13	*I present food in an attractive way to my child*	.12	.75	.07	-.07	.60

Table 4. Analysis of the dimensional structure of the Parental Feeding Style Questionnaire (PFSQ), culturally adapted for the Brazilian context, using exploratory structural equation models. Preschool children (4 to 5 years and 11 months old; n=269). Rio de Janeiro, Brazil, 2018.(Continues)

Item		Model: 4-factor ESEM				
		$\lambda_{i(1)}$ [a]	$\lambda_{i(2)}$	$\lambda_{i(3)}$	$\lambda_{i(4)}$	δ_i [b]
i14	*I encourage my child to taste each of the foods I serve at mealtimes*	-.08	.56	-.01	.01	.47
i15	*I encourage my child to try foods that s/he hasn't tasted before*	-.08	.64	.20	.11	.57
i16	*I encourage my child to enjoy his/her food*	.06	.63	-.06	.14	.56
i17	*I praise my child if s/he eats a new food*	.03	.05	.04	.01	.59
i18	*I decide when it is time for my child to have a snack*	.02	.01	.83	.02	.28
i19	*I decide how many snacks my child should have*	.02	.03	.85	.03	.26
i20	*I decide what my child eats between meals*	-.06	.04	.64	.07	.56
i21	*I decide the times when my child eats his/her meals*	-.00	-.04	.53	-.00	.71
i22	*I insist my child eats meals at the table*	-.12	-.03	.34	.09	.87
i23	*I allow my child to choose which foods to have for meals*	.06	-.16	.03	.43	
i24	*I allow my child to wander around during a meal*	-.21	.13	.06	.51	.65
i25	*I allow my child to decide when s/he has had enough snacks to eat*	-.12	-.01	.18	.54	.60
i26	*I let my child eat between meals whenever s/he wants*	.11	-.01	.07	.63	.59
i27	*I let my child decide when s/he would like to have her meal*	.01	.11	-.06	.62	.62
	Modification index					
	i3 ON Fator 1			31.444		
	i4 ON Fator 3			21.043		
	RMSEA [d]			.050 (.042;.059)		
	CFI [e]			.926		
	TLI [f]			.896		

[a] Factor loadings (standardized). [b] Measurement errors (uniqueness). [c] Root Mean Square Error of Approximation; in brackets: 90% confidence intervals. [d] Comparative Fit Index. [e] Tucker-Lewis Index

The third stage of the statistical analysis consisted of identifying more parsimonious factors by evaluating the estimates found in the ESEM shown in Table 4. Table 5 shows the results obtained with a CFA focusing on the items retained in the parsimonious factors. The solution presented satisfactory adjustment indices (RMSEA<0.06, and TLI and CFI>0.90).[13] All loadings were greater than 0.4, ranging from 0.49 to 0.86. Only two items showed residuals (δ_i) above 0.7. No MI and standardized EPC values were ≥0.20.

Table 5. Confirmatory factor analysis of the four-factor structure of the Parental Feeding Style Questionnaire (PFSQ), culturally adapted for the Brazilian context. Preschool children (4 to 5 years and 11 months old; n=269). Rio de Janeiro, Brazil, 2018.

Dimension	Item		Model: 4-factor CFA					Subscale Cronbach's alpha coefficient (lower limit of 95% confidence interval)
			$\lambda_{i(1)}$ [a]	$\lambda_{i(2)}$	$\lambda_{i(3)}$	$\lambda_{i(4)}$	δ_i [b]	
Instrumental and emotional feeding	i1	*In order to get my child to behave him/herself I promise him/her something to eat*	.56				.68	.80 (.77)
	i3	*I use sweets as a bribe to get my child to eat his/her main course*	.51				.74	
	i4	*I reward my child with something to eat when s/he is well behaved*	.71				.50	
	i5	*I give my child something to eat to make him/her feel better when s/he is feeling upset*	.65				.58	
	i6	*I give my child something to eat to make him/her feel better when s/he has been hurt*	.74				.45	
	i7	*I give my child something to eat if s/he is feeling bored*	.79				.38	
	i8	*I give my child something to eat to make him/her feel better when s/he is worried*	.81				.34	
	i9	*I give my child something to eat to make him/her feel better when s/he is feeling angry*	.68				.54	
Prompting or encouraging to eat	i11	*I praise my child if s/he eats what I give him/her*		.65			.59	.71 (.66)
	i13	*I present food in an attractive way to my child*		.60			.64	
	i14	*I encourage my child to taste each of the foods I serve at mealtimes*		.68			.53	
	i15	*I encourage my child to try foods that s/he hasn't tasted before*		.61			.63	
	i16	*I encourage my child to enjoy his/her food*		.69			.53	
	i17	*I praise my child if s/he eats a new food*		.66			.56	

Table 5. Confirmatory factor analysis of the four-factor structure of the Parental Feeding Style Questionnaire (PFSQ), culturally adapted for the Brazilian context. Preschool children (4 to 5 years and 11 months old; n=269). Rio de Janeiro, Brazil, 2018. .(Continues)

Dimension	Item		Model: 4-factor CFA					Subscale Cronbach's alpha coefficient (lower limit of 95% confidence interval)
			$\lambda_{i(1)}$ [a]	$\lambda_{i(2)}$	$\lambda_{i(3)}$	$\lambda_{i(4)}$	δ_i [b]	
Control over eating	i18	*I decide when it is time for my child to have a snack*			.86		.26	.75 (.71)
	i19	*I decide how many snacks my child should have*			.86		.27	
	i20	*I decide what my child eats between meals*			.67		.57	
	i21	*I decide the times when my child eats his/her meals*			.56		.68	
Permissive feeding	i24	*I allow my child to wander around during a meal*				.61	.63	.58 (.50)
	i25	*I allow my child to decide when s/he has had enough snacks to eat*				.70	.51	
	i26	*I let my child eat between meals whenever s/he wants*				.57	.68	
	i27	*I let my child decide when s/he would like to have her meal*				.49	.76	
RMSEA[c]			.047 (.038;.056)					
CFI [d]			.936					
TLI [e]			.928					

[a] Factor loadings (standardized). [b] Measurement errors (uniqueness). [c] Root Mean Square Error of Approximation; in brackets: 90% confidence intervals. [d] Comparative Fit Index. [e] Tucker-Lewis Index

The analyses led to renaming the questionnaire dimensions. Therefore, dimension 1 was renamed as 'instrumental and emotional feeding' (8 items: i1, i3, i4, i5, i6, i7, i8, i9); dimension 2 maintained the designation 'prompting or encouragement to eat' (6 items: i11, i13, i14, i15, i16, i17); dimension 3 was named 'control over eating' (4 items: i18, i19, i20, i21); and dimension 4 was named 'permissive feeding '(4 items: i24, i25, i26, i27). Cronbach's alpha coefficient was 0.73 (one-sided confidence interval: 0.69) for the final model instrument, 0.80 for instrumental and emotional feeding, 0.71 for prompting or encouragement to eat, 0.75 for control over eating, and 0.58 for permissive feeding.

DISCUSSION

The present study evaluated the internal consistency and structural validity of the translated and culturally adapted version of the PFSQ, originally elaborated by Wardle et al.,[10] aiming to characterize the parental feeding style of parents/guardians of preschoolers. The psychometric evaluation using Cronbach alpha and exploratory and confirmatory factor analyses led to the exclusion of 5 out of 27 questions and a reorganization of item grouping. Therefore, the proposed 22-question instrument allows the identification of four dimensions of parental feeding style, namely: (a) *instrumental and emotional feeding* (8 items)*;* (b) *prompting or encouragement to eat* (6 items)*;* (c) *control over eating* (4 items) and (d) *permissive feeding* (4 items).

This structure differs from the original as it includes the parental style "permissive" and rearranges the "emotional" and "instrumental" dimensions into a single one.

According to Lauzon-Guillain,[18] when choosing an instrument to characterize parental feeding style, the instrument's context and purpose should be considered. For example, there are scales elaborated to identify parents/guardians' practices such as restriction or pressure over feeding,[19] or the use of food as a reward or emotional regulation.[20] The PFSQ was chosen for this study for being previously used on children of the same age, for being easily understood, for including a relatively low number of questions, and for including emotional aspects within the dimensions analyzed, describing situations in which food is used to compensate negative feelings such as distress, boredom, sorrow, preoccupation, and anger. Another positive aspect of this instrument is that it does not refer to specific types of food, making easier its adaptation to the Brazilian context. Besides, as Kidwell et al.[21] pointed out, this questionnaire is widely accessible.

Comparable findings were observed in other studies that evaluated the psychometric qualities of adapted versions of the Parental Feeding Style Questionnaire. Kidwell et al.[21] applied the PFSQ to 297 parents/guardians of children aged 3 — 5 years and used CFA to assess its factor structure. The authors also proposed the modification of the original instrument, where the main alterations were the exclusion of six items (i3; i11; i17; i22; i23; i24) distributed in five dimensions: "control over feeding", "instrumental feeding", "emotional feeding", "stimulus to variety", and "stimulus to food intake". Tam et al.,[22] in Hong Kong, developed a study with 4,553 parents/guardians of preschoolers to evaluate the internal consistency and structural validity of a Chinese version of the PSFQ. The authors estimated values of the Cronbach's alpha that ranged between 0.63 and 0.81. All original items were retained and five dimensions were proposed: "instrumental feeding", "emotional feeding" and "prompting or encouragement to eat" remained identical to the original proposal of Wardle et al.,[10] while the dimension "control over eating" was subdivided into "restrictive" and "permissive", with five items each. Similarly, Õzçetin et al.[23] evaluated the structural validity and the internal consistency of the Turkish version of the PSFQ in study with 468 parents of preschoolers between 2 and 9 years old. The version proposed by the authors also presented five dimensions of the parental feeding style: emotional feeding, encouragement, instrumental feeding, flexible control over feeding, and rigid control over feeding with Cronbach alpha values ranging between 0.54 and 0.83.

This study is not free of limitations. The sample, selected by convenience, limits the generalizability of the results. Nevertheless, the sample size evaluated (n=269) met the minimum recommended of 10 participants per each parameter evaluated in Structural Equation Models.[24] The strengths of this study are the rigorous methods applied in the process of cross-cultural adaptation and the robust analyses of the instrument's psychometric properties.

The Brazilian version of the PSFQ diverges slightly from the original structure proposed by Wardle et al.,[10] resulting in an instrument with a reduced number of items distributed into four revised dimensions. The adapted questionnaire presented satisfactory psychometric properties and enabled to characterizing how parents/guardians of preschoolers deal with their children's feeding. Studies using this instrument might support the elaboration of strategies in nutritional counseling and healthy eating promotion actions. Future studies should evaluate additional psychometric properties across broader and more diverse samples, including different age groups to expand the scope of the instrument in the Brazilian context.

CONCLUSION

The proposed tool consists of 22 questions grouped into four dimensions of parental feeding style, specifically, *instrumental and emotional feeding*, *prompting or encouragement to eat*, *control over eating*, and *permissive feeding*.

The psychometric evaluation of the instrument developed to characterize the parental feeding style of Brazilian parents/guardians of preschoolers yields the proposition of a concise, easy-to-administer questionnaire, which allows evaluation of different aspects of parental behavior toward children's eating habits.

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Coura CP, Marques ES, Monteiro LS, de Vasconcelos TM and Pereira RA participated in all stages, from conception of the study until the review of the final version of the article.

Conflict of Interest: The authors declare no conflict of interest

Received: September 16, 2024
Accepted: June 11, 2025