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ORIGINAL ARTICLE

Translation, Cross-cultural Adaptation and Psychometric Properties of the Parental Feeding Style Questionnaire into Brazilian Portuguese Language

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ABSTRACT

Objective: To translate, cross-culturally adapt and test the psychometric properties of the Parental Feeding Style Questionnaire (PFSQ) to Brazilian Portuguese language. **Material and Methods:** Three stages were carried out: 1st, the 27-item of PFSQ was translated, back-translated, reviewed by a Committee of Experts and pre-tested (n=60), obtaining the cross-culturally adapted version. 2nd, the final version was self-applied by 42 mothers for internal consistency (Cronbach's Alpha). After 2-weeks, 19 mothers answered the PFSQ again for reproducibility (Intraclass Correlation Coefficient, ICC). 3rd, 204 mothers of children aged 4-5 years answered the PFSQ for translation validation [convergent validity and exploratory factor analysis (EFA)]. **Results:** For subscales, Cronbach's alpha ranged from 0.65 to 0.82; the overall reliability was 0.69, indicating substantial internal consistency. The ICC for overall PFSQ was 0.78 and for domains 0.56-0.89, indicating moderate to excellent reproducibility. 'Control over eating' correlated positively with 'prompting/encouragement to eat' and negatively with 'instrumental feeding'; 'prompting/encouragement to eat' correlated positively with 'emotional feeding'. By EFA, PFSQ items were loaded on four factors. 'Control over eating' and 'prompting/encouragement to eat' settled into two factors, whereas the 'emotional' and 'instrumental feeding' domains into one factor each. **Conclusion:** Despite the different factors found by AFE related to the original PFSQ, the reliability was satisfactory, making the Brazilian Portuguese version of the PFSQ adequate to assess parental feeding style.

Keywords: Child; Feeding Behavior; Mothers; Surveys and Questionnaires; Translation.

Introduction

The development of healthy eating behaviors in early childhood is desirable because an unbalanced diet can lead to problems of obesity and noncommunicable diseases [1]. Healthy and unhealthy eating habits established in childhood seem to continue into adulthood [2]. Parents' feeding style can influence the development of eating behavior [3,4] and children's weight [3]. This can be in accordance with how the parents interact with their children and become important the emotional quality of this interaction [1]. Parental feeding practices play an important role in the development of children's food tastes [2] and children´s food behavior [1,2,4,5].

Parental feeding is a potential modifier on the association between general parenting and child weight [6,7] and its evaluation requires multi-dimensional psychometric measures sorted by control/demandingness and warmth/responsiveness [8]. Based on that, four parenting styles can be classified: authoritative, authoritarian, indulgent and neglectful [9]. Authoritative parenting, high control and high warmth are characterized by high involvement and high strictness [10]. While authoritarian is high control and low warmth. In general, indulgent and neglectful could be considered into permissive parents that may have low expectations for child self-control and/or set few limits [10].

Several instruments have been developed for assessing the dimensions of parenting feeding style, such as Caregiver's Feeding Style Questionnaire (CFSQ), Infant Feeding Style Questionnaire (IFSQ), Child Feeding Questionnaire (CFQ) and Parental Feeding Style Questionnaire (PFSQ) [5]. However, only PFSQ assesses instrumental, emotional, and encouragement feeding, which reflects, respectively, the consistency, incentive of autonomy, and overprotection in general from parents [6].

The PFSQ was developed by Wardle et al. [5] to verify whether obese mothers with young children used different feeding styles comparing them with normal-weight mothers since the concept of parental feeding style influencing the intergenerational transmission of obesity was sparse, despite its popular appeal. The first version of PFSQ, containing 52 questions, was constructed considering studies on parents' feeding behaviors, in addition to previous studies about measures of parents' and children's adiposity [11,12]. After that, the first version was pretested and a final 27-item version was obtained with four coherent domains related to feeding styles: 'control over eating', 'prompting/encouragement to eat', 'instrumental feeding' and 'emotional feeding'. The final version was applied in a large sample (n=221), and the internal reliability coefficients were calculated by Cronbach's α for each domain, varying from 0.65 to 0.85. For test-retest reliability (n=166), the Pearson correlations were applied, obtaining significant coefficients from 0.76 to 0.83 [5]. It is known that 'control over eating' and 'prompting/encouragement to eat' have been associated with a higher intake of fruits and vegetables [4,5], while 'instrumental feeding' and 'emotional feeding' have been associated with a higher unhealthy food feeding [3,5].

Studies have linked infant feeding to early experience with food, suggesting that parental feeding practices may be involved as a trigger for health problems [4], such as obesity [1,3], and dental caries [13]. Knowing the determinants of nutrition, such as the behavior of parents feeding their children, can lead to relevant implementations in the prevention of chronic disease and children's oral health. In this context, the PFSQ has been considered an important tool for assessing parental feeding and has been widely used in other languages and cultures [3,4,7]. Nevertheless, a validated instrument remains unavailable in the Brazilian Portuguese language. For this reason, this study aimed to translate and carry out the cross-cultural adaptation of PFSQ into Brazilian Portuguese language; and validate the questionnaire for use with Brazilian mothers.

Material and Methods

Ethical Issues

Written authorization was obtained from the corresponding author of the original questionnaire for translation, cross-cultural adaptation, and validation processes into Brazilian Portuguese language. The Municipal Secretary of Education of Piracicaba city, São Paulo, Brazil, authorized the development of the study at public schools. All participants or guardians signed the informed consent form.

This cross-sectional survey is part of a major research project submitted to and approved by the Research Ethics Committee at Piracicaba Dental School, University of Campinas (FOP/UNICAMP), under CAAE: 86582318.6.0000.5418. This study was developed in three stages: (1st) translation and cross-cultural adaptation; (2nd) reliability (internal consistency and reproducibility); and (3rd) validation of the Brazilian Portuguese version of PFSQ.

First Stage: Translation and Cross-cultural Adaptation

Instrument

The PFSQ is a specific and self-administered instrument composed of 27 items that assess the parents' styles of feeding their children. The questions in the four domains of the PFSQ are distributed as follows: 'control over eating' (ten items), 'prompting/encouragement to eat' (eight items), 'instrumental feeding' (four items), and 'emotional feeding' (five items). 'Control over eating' is when parents control the quality and quantity of food their children consume; 'prompting/encouraging to eat' children to eat means inducing/encouraging them consume a variety of food; 'instrumental feeding' means rewarding children with food to avoid bad behavior or to ensure healthy eating; and 'emotional feeding' refers to giving food to children in response to feelings such as discomfort and boredom [4]. The items are measured on a 5-point Likert scale that varies from "never" (1 point) to "always" (5 points) [10]. A higher average score on each domain implied a greater tendency for parents to adopt specific styles. Therefore, questions 1, 11, 14, 16 and 23 related to 'control over eating' were reversed questions [5].

The translation and cultural adaptation process of the PFSQ followed the method of Guillemin et al. [14]: translation, back-translation, expert committee review, and cultural adaptation.

Translation and Back-Translation

The first specific aim was to test the hypothesis that the Brazilian Portuguese version of the PFSQ was well understood by mothers of 24 to 60 months-old children. Initially, the English version of the PFSQ was translated independently by two Brazilian pediatric dentists fluent in English who did not know the objective of the study. A conceptual equivalent of a word or phrase was emphasized (emphasis on communication) rather than the literal one (word-for-word translation), resulting in two translation versions: T1 and T2. After that, two other bilingual English translators who did not participate in the first stage of translation and who were unaware of the original instrument made the back-translations (BT1 and BT2).

Then, a Committee of Experts composed by two Brazilian pediatric dentists, fluent in English and experienced in the area, evaluated the translations, back-translations and original English scale, considering the semantic, idiomatic, cultural and conceptual equivalences [14,15]. Thus, the first Brazilian Portuguese version was obtained (V_1).

Cross-Cultural Adaptation

Participants

This stage was carried out with mothers of 36 to 60 months-old children in Piracicaba city, São Paulo state, Brazil. The sample size was based on Manzato and Santos [16], requiring about 20 participants for each stage of the pretest.

Pretest

V1 was self-applied by a convenience sample of 25 mothers, not included in the final sample, whose children were patients at the Pediatric Clinic of the Piracicaba Dental School, University of Campinas, Piracicaba, SP, Brazil. An alternative answer option, "I do not understand", was added to each question on the PFSQ. This phase aimed to verify the clarity and conciseness of the questions. To confirm cross-cultural adaptation of the instrument, at least 85% of mothers should not have any difficulty answering each question [14]. In this stage, one question (item 23) was misunderstood by more than 15% of participants and was reassessed by the Committee of Experts and replaced by the same concept without changing its structure and property. After these modifications, the second Brazilian Portuguese version (V_2) was self-applied by another group of 35 mothers (of a total of 49 mothers; answer rate = 71.42%) of children from public schools in the city of Piracicaba, and all questions were understood by more than 85% of the sample. Thus, a comprehensive adapted version of the PFSQ for the evaluated sample was obtained.

Second Stage: Reliability (Internal Consistency and Reproducibility)

The second specific aim was to test the hypothesis that the Brazilian Portuguese version of the PFSQ was reliable to measure the mothers' styles of feeding their children. The final translated adapted version of the questionnaire (V_2) was self-applied by a sample of 42 mothers who did not participate in the first stage, to test the internal consistency of the questionnaire, using Cronbach's alpha coefficient [17], as follows: slight ($\alpha \leq 0.21$); fair ($0.21 < \alpha < 0.40$); moderate ($0.41 < \alpha\ 0.60$); substantial ($0.61 < \alpha\ 0.80$) and almost perfect ($\alpha > 0.80$) [18]. Two weeks after the first application, 19 of the 42 mothers were randomly selected to complete the questionnaire again to verify the reproducibility of the instrument (test-retest), using the Intraclass Correlation Coefficient (ICC) [19], as follows: poor ($ICC \leq 0.40$); moderate ($0.41 < ICC < 0.60$); substantial ($0.61 < ICC < 0.80$); excellent to almost perfect ($0.81 < \alpha\ 1.0$) [20].

The sample size calculation for this stage was based on the study by Wardle et al. [5], taking into account the following Pearson's correlation coefficients (r) for each domain of the PFSQ: 0.83 for 'control over eating'; 0.76 for 'prompting/encouragement to eat'; 0.82 for 'instrumental feeding'; and 0.76 for 'emotional feeding'. Considering the smaller correlation coefficient (r=0.76), the test power of 0.85, the alpha level of 0.05, and the correction factor of 1.234, a minimum sample of 16 individuals was required. The inclusion criteria were mothers of three- to five-year-old children from public schools in Piracicaba city, São Paulo, Brazil.

Third Stage: Validation

The third specific aim was to test the hypothesis that the Brazilian Portuguese version of the PFSQ was valid to measure the mothers' styles of feeding their children. Construct validity through convergent validity was verified, assuming that most domains would be correlated with the overall score of PSFQ [21].

A sample of 204 mothers of 48 to 60 months-old children from four public schools of Piracicaba participated in this stage. The sample calculation was based on the mean score (SD) of PFSQ overall and the highest standard deviation, 3.33 and 0.70, respectively, from Tam et al. [7]. Considering the test power of 0.90,

an alpha level of 0.05, and a correction factor of 1.234, the minimum sample size required was 178 mothers. To compensate for the loss of the sample, approximately 20% of mothers were added.

First, pre-structured questionnaires were sent to the mothers to be answered at home, which contained questions related to biological characteristics (age, sex, self-reported race and self-reported weight and height) and socioeconomic factors (education, marital status, employment, family, income). After that, the PFSQ was self-applied. Exploratory factor analysis (EFA) was used for validation of the PFSQ in Brazilian Portuguese language. The BMI of the mothers was calculated to verify their weight status according to the World Health Organization (WHO) standard [22].

Statistical Analysis

The data were analyzed in SPSS version 23 software, with a significance level of $\alpha = 0.05$. The results were submitted to descriptive analysis (mean, standard deviation, percentage). To test the reliability of the questionnaire, internal consistency and reproducibility were determined by calculating Cronbach's alpha coefficient [17] and the intraclass correlation coefficient (ICC) [18], respectively. Construct convergent validity was calculated by inter-domain correlations using Pearson's correlation.

For validation, the exploratory factor analysis (EFA) using Varimax rotation with Kaiser normalization was applied to the 27 items of PFSQ to determine the underlying factor structure of the questionnaire. This factor explains the common variance among the questions [23]. They were extracted through the correlation polychoric matrix, from its decomposition, generating eigenvalues, which must be >1 explaining the total variance (communality). The generated factor loads indicate how much each question was associated to each factor (corresponding to the domain of the PFSQ) [24].

The Bartlett test of Sphericity [25] and Kaiser-Meyer-Olkin (KMO) test [26,27] must be applied to verify the correlation between the original questions and evaluate the sampling adequacy to carry out a factor analysis, respectively. The Bartlett test must have a p-value <0.05, while KMO test should be close to 0.5 for a satisfactory factor analysis to be proceed [25,27]. Nunnally guidelines [28] were used to interpret corrected item-total correlation according to the following parameters: 0.30 considered as the minimal level, above 0.30 as "good", equal or above 0.40 an "important level", equal or above 0.50 a "significant level". A value below 0.15 is considered unreliable [28].

Results

First Stage

During cross-cultural adaptation, the Brazilian Portuguese version was pretested to verify the comprehension of the questions. Only question 23 ('*I let my child eat between meals whenever s/he wants*') was not understood by 24% of the 25 mothers ('*Eu permito que meu filho (a) coma entre refeições*') and needed to be rewritten by the Committee of Experts. Then, a new version (V_2) with a modified item was proposed ('*Eu permito que meu filho(a) coma algum alimento no período entre o café da manhã e o almoço e/ou almoço e jantar*') and pre-tested in a new sample of 35 mothers.

Second Stage

Table 1 shows the reliability results of the PFSQ total and domains. Cronbach's alpha for PFSQ total was 0.78, indicating substantial internal consistency. For the domains, the coefficient ranged from 0.64 for 'instrumental feeding' to 0.86 for 'emotional feeding' when applied first to the 42 mothers and from 0.57 to 0.92

for the same domains in the second application when 19 mothers answered, indicating 'substantial' to 'almost perfect' internal consistency. The test-retest with 19 mothers showed that the total PFSQ scale presented substantial reproducibility (ICC=0.78) and ranged from moderate 'instrumental feeding' (ICC=0.56) to excellent agreement for 'emotional feeding' (ICC=0.89).

Table 1. Second stage: reliability of the PFSQ.

PFSQ Total and Domains Scores	No. of Items	Cronbach's Alpha (N=42)	Cronbach's Alpha (N=19)	ICC (95%) (N=19)
Control Over Eating	10	0.77	0.77	0.74
Prompting/Encouragement to Eat	8	0.74	0.75	0.67
Instrumental Feeding	4	0.64	0.57	0.56
Emotional Feeding	5	0.86	0.92	0.89
Total	27	0.78	0.80	0.78

Third Stage

In data analysis, it was found that of the 217 participating mothers, 13 had missing values that did not allow their inclusion in the statistical analyses. Thus, the final sample consisted of 204 mothers whose sociodemographic and anthropometric measures are shown in Table 2.

Table 2. Third stage: Descriptive data for demographic variables.

Variables	N	%
Mother		
Age (Years) [Mean and SD]	32.12	6.8
Weight*(kg) [Mean and SD]	71	14.7
Height* (m) [Mean and SD]	1.61	0.1
BMI [Mean and SD]	27.14	5.8
Underweight	4	2
Normal weight	75	36.8
Overweight	69	33.8
Obesity	54	26.5
No Information	2	1
Mother's Marital Status		
Single	50	24.6
Married	110	54.2
Other	36	17.7
No Information	7	3.4
Mother's Educational Status		
Uneducated	7	3.4
1th degree	34	16.7
2nd degree	97	47.5
Graduated	32	15.7
No information	34	16.7
Income (USA Dollar)		
D category	62	30.4
C category	79	38.7
B category	5	2.5
No information	58	28.4

SD: Standard Deviation; BMI: Body Mass Index; *Due to missing data, the sum of percentages may not equal 100%; Income category: B ≥ U$1,545.65; C ≥ U$479.06 and D ≥ U$197.20; Confidence Interval of 95%.

Table 3 shows the reliability data of the PFSQ. The overall mean (SD) score was 2.91±0.69 and ranged from 1.68±0.81 for 'emotional feeding' to 4.25±0.54 for 'prompting/encouragement to eat'. The overall Cronbach´s alpha for 27 items was 0.69, indicating substantial internal consistency. For domains, the values

ranged from 0.65 for 'control over eating' to 0.82 for 'emotional feeding', representing substantial to almost perfect reliability.

Table 3. Third stage: reliability of the PFSQ.

PFSQ Domains	Number of Items	Mean Score (SD)	Cronbach's Alpha	Cronbach's Alpha if Item is Deleted
Control over eating	10	3.83±0.58	0.65	0.57 - 0.68
Prompting/ Encouragement to eat	8	4.25±0.54	0.68	0.60 - 0.67
Instrumental feeding	4	1.85±0.82	0.67	0.51 - 0.66
Emotional feeding	5	1.68±0.81	0.82	0.76 - 0.80
Overall	27	2.91±0.69	0.69	0.65 - 0.68

PFSQ: Parent Feeding Style Questionnaire; SD: Standard Deviation; ICC: Intraclass Correlation Coefficient (Confidence Interval of 95%).

Table 4 contains the Pearson correlation coefficients between the domains and between each domain with the overall score of the PSFQ. All domains have a significant correlation with the overall score. The domain 'control over eating' was positively correlated with 'prompting/encouragement to eat' ($p<0.01$) and negatively with 'instrumental feeding' ($p<0.05$), despite the low coefficients. 'prompting/encouragement to eat' was positively correlated with 'emotional feeding' ($p<0.01$).

Table 4. Third stage: convergent validity of the PFSQ.

Variables		Control Over Eating	Prompting/ Encouragement to Eat	Instrumental Feeding	Emotional Feeding
Control Over Eating	r	1			
	p-value	-			
Prompting/Encouragement to Eat	r	0.40	1		
	p-value	<0.01	-		
Instrumental Feeding	r	-0.17	-0.08	1	
	p-value	0.014	0.251	-	
Emotional Feeding	r	-0.14	-0.10	0.59	1
	p-value	0.052	0.153	<0.01	-
Overall	r	0.65	0.61	0.44	0.49
	p-value	<0.01	<0.01	<0.01	<0.01

PFSQ: Parental Feeding Style Questionnaire.

Bartlett and KMO tests were acceptable, with values of 0.75 and $p<0.001$, respectively, concluding that questions were correlated significantly and able to perform EFA. Looking at Table 5, PFSQ items are substantially loaded on four factors. The 'control over eating' domain was allocated into two factors, as well as 'prompting/encouragement to eat'. In contrast, the 'emotional' and 'instrumental feeding' domains settled into one factor each (Table 5).

Table 5. Rotating component matrix.

Questions	Original Domain	F 1	F 2	F 3	F 4	h^2
2. I give my child something to eat to make him/her feel better when she/he is feeling upset	EM	0.694				0.48
13. I give my child something to eat to make him/her feel better when she/he has been hurt	EM	0.733				0.55
15. I give my child something to eat if she/he is feeling bored).	EM	0.710				0.55
21. I give my child something to eat to make him/her feel better when she/he is worried	EM	0.677				0.52
25.I give my child something to eat to make him/her feel better when she/he is feeling angry	EM	0.790				0.63

7. In order to get my child to behave him/herself I promise him/her something to eat.	IN	0.637				0.50
9. If my child misbehaves, I withhold his/her favourite food	IN	0.441				0.43
18. I use puddings as a bribe to get my child to eat his/her main course	IN	0.397				0.22
22. I reward my child with something to eat when she/he is well behaved	IN	0.791				0.63
5. I decide how many snacks my child should have	C		0.548			0.34
17. I decide when it is time for my child to have a snack	C		0.363			0.28
20. I decide the times when my child eats his/her meals	C		0.624			0.60
24. I insist my child eats meals at the table.	C		0.483			0.30
26. I decide what my child eats between meals	C		0.413			0.29
3. I encourage my child to look forward to the meal	EN		0.408			0.38
6. I encourage my child to eat a wide variety of foods	EN		0.532			0.41
8. I present food in an attractive way to my child	EN		0.631			0.39
4. I praise my child if she/he eats what I give him/her	EN			0.512		0.27
10. I encourage my child to taste each of the foods I serve at mealtimes	EN			0.560		0.47
12. I encourage my child to try foods that she/he hasn't tasted before	EN			0.663		0.52
19. I encourage my child to enjoy his/her food	EN			0.645		0.50
27. I praise my child if she/he eats a new food	EN			0.586		0.38
1. I allow my child to choose which foods to have for meals	C				0.629	0.44
11. I allow my child to wander around during a meal	C				0.431	0.34
14. I let my child decide when she/he would like to have her meal.	C				0.594	0.43
16. I allow my child to decide when she/he has had enough snacks to eat	C				0.469	0.28
23. I let my child eat between meals whenever she/he wants	C				0.483	0.42
Eigenvalue		4.75	3.29	2.00	1.42	
N° items		9	8	5	6	
% Variance		17.7	12.2	7.4	5.2	

EM: Emotional Feeding; IN: Instrumental Feeding; C: Control Over Eating; EN: Encouragement to Eat.

Discussion

This study was developed in Piracicaba, located in the state of Sao Paulo, Brazil, with an estimated population of 407,252 inhabitants; 30.8% of the population has a per capita income of half minimum wage (class D), and the schooling rate from 6 to 14 years of age is 97.5% [29]. In the present study, approximately 70% of mothers were from socioeconomic classes D and C, and the majority were classified as obese, corroborating Tam et al.'s [7] and Pimenta et al.'s [30] studies. Moreover, more than half of the mothers had an undergraduate degree, corroborating Tam et al.'s [7] study but contrasting with Pimenta et al.'s [30] study.

To translate a questionnaire, a well-defined methodology must be chosen to have the same effect as the original instrument in the culture being adapted [31]. For that reason, as the methodology of Guillemin et al. [14] has the respective characteristics [31,32], it was chosen for translation, back-translation, and cross-cultural adaptation of the PFSQ into Brazilian Portuguese language. Additionally, the reliability of the translated instrument was verified by internal consistency or homogeneity, which checks whether all the components of an instrument measure the same characteristics [17,33,34]. The ICC, another reliability criterion, was used to measure the similarity of results obtained at two different times [19,20,33,35].

Moreover, Cronbach's alpha coefficient is the most widely used measure to check internal consistency, demonstrating the level of covariance between items on a scale [33], although there is still no consensus on its interpretation. Some studies determine that values higher than 0.7 are ideal [28,35], whereas others consider

values below 0.70 - but close to 0.60 - as satisfactory [19], as used in the present study. In the second stage of this study, the PFSQ overall scale showed substantial internal consistency and reproducibility in both applications. For domains, a range from substantial to almost perfect homogeneity and from moderate to almost perfect agreement was observed. These preliminary analyses predicted satisfactory reliability for the Brazilian Portuguese version of the PFSQ, and a larger sample was necessary to confirm these findings.

To ensure that the new version demonstrates the measurement properties required for the intended application [15], in the third stage, the Brazilian Portuguese version of the PFSQ was applied to a new sample of 204 mothers. Overall, the PFSQ showed substantial internal consistency. For domains, the values ranged from substantial to almost perfect reliability, corroborating Wardle et al.'s [5] study. In addition, other translations of the PFSQ, such as European Portuguese [30], Chinese [7], Turkish [36] and Dutch translate versions [37], found similar results ranging from 0.67 to 0.88, 0.63 to 0.82, 0.64 to 0.80 and 0.64 to 0.80, respectively. Despite cultural differences, the present results agree with others [5,30,36,37], demonstrating that mothers seem to practice controlling overeating and prompting / or encouraging to eat during feeding since these domains were significantly higher than 'instrumental feeding' and 'emotional feeding'. In addition, all domains were significantly correlated with the overall score of the PFSQ, meaning that the domains have the same evaluation trend in relation to the studied phenomenon [21], that is, the adequacy existing between the chosen variables and the theoretical concept to be measured [38].

Wardle et al. [5] reported higher levels of 'control over eating' and 'prompting/encouragement to eat' and lower levels of 'instrumental feeding' and 'emotional feeding', corroborating the present findings, which found a significant gradient in domains, that is: 'prompting/encouragement to eat' > 'control over eating' > 'instrumental feeding' > 'emotional feeding' mean scores. In Chinese culture, mothers reported higher levels of 'control over eating' during feeding practice, followed by 'prompting/encouragement to eat', 'instrumental feeding' and 'emotional feeding' [7]. Additionally, in European Portuguese culture, mothers more frequently reported permissiveness, 'control over eating', and 'prompting/encouragement to eat', with less frequent 'instrumental feeding' and 'emotional feeding' [30]. Although in Turkish culture [36], the most practiced feeding style was 'prompting/encouragement to eat' and restrictive control, due to the internal dynamics of the society, the 'control over eating' domain had a subdivision of restrictive control in which parents do not concede choices to their children regarding their feeding. This restrictive control was followed by 'emotional feeding', permissive 'control over eating' and 'instrumental feeding'. Despite cultural differences, parents/caregivers tend to encourage their children to eat new and/or healthy foods through established family rules. Then, the reliability during the validation for the Brazilian Portuguese version was satisfactory, making the PFSQ adequate to assess parental feeding style to be used in other groups in Brazil.

Additionally, the EFA was chosen to confirm or refute the factorial structure of the PFFQ. Bartlett and KMO tests were acceptable, with values of 0.75 and $p<0.001$, respectively, concluding that variables were correlated significantly to perform EFA [25,27]. The Varimax orthogonal rotation was used because it is the most used method seeking to minimize the number of variables that present high loads in each factor [27], as done in other studies [7,36,37].

According to EFA, a structure on four scales was identified, in agreement with the original questionnaire formed by four factors or domains, but with some differences for fitting the questions. The four-factor found was explained by the variance of 42.54% in PFSQ responses. The original 'control over eating' domain was settled into Factor 2, sharing with three questions of "encouragement" and in Factor 4. The 'control over eating' domain into two factors were also reported by Turkish study, using principal components analysis

with Varimax rotation [36], and Chinese study, using [7]; however, the item "I insist my child eats meals at the table" was set in different factor in both studies. The other questions of 'prompting/encouragement to eat' composed the Factor 3. In contrast, the emotional and instrumental domain settled into one factor. These findings, showing allocations of the PFSQ questions in factors differently of the original questionnaire, are in accordance with previous translations for Dutch language [37], Chinese language [7], Turkish [36], and European Portuguese language [30]. For the Chinese version two-factor structure in AFE Varimax rotation analysis of PFSQ were found, followed by one-factor structure after the analysis for scree plot graphic [7].

Similar to the Turkish version [30], the Chinese PSFQ found one-factor structure for 'emotional feeding', 'instrumental feeding', and 'prompting/encouragement to eat', while a two-factor structure was found for 'control over eating' [7]. In the present Brazilian Portuguese PFSQ, two-factor structure were found for 'control over eating' and 'prompting/encouragement to eat' while one-factor for 'instrumental feeding' and 'emotional feeding' domains was found. Like this, the 'control over eating' domain was confirmed as a two-factor construct in European Portuguese language [30]. For Sleddens et al. [37] the EFA showed that 'instrumental feeding' and 'emotional feeding' domains fit into one scale and prompting/encouragement to eat' was divided into two subscales, corroborating this study. However, 'instrumental feeding' and 'emotional feeding' practices due to their similarity of the concept of reward showed no discriminant validity [30]. Kidwell et al. [39] results provided preliminary support for a five-factor structure by means of factor analyses using robust maximum-likelihood.

Those divergent results indicate the need for future researches to refine the measurement of parental feeding styles, such as confirmatory factorial analysis. In addition, cultural differences related to life habits can become subtle when the questionnaire is being filled in, determining different factors to allocate the questions. Nevertheless, it is recommended four-factor solution as defined by Wardle and colleagues [5] for general use [37]. Despite the different factors found by AFE related to the original PFSQ, the reliability during the validation for the Brazilian Portuguese version was satisfactory, making the PFSQ to suitable to assess the parental feeding style to be used in Brazilian families.

Some limitations should be stated concerning the present findings, especially the fact that this research had a convenience sample: low-income and education mothers of four- and five-year-old children from public schools in Piracicaba, São Paulo, limiting the generalization of the results. Further studies with mothers with a variety of educational, social and cultural characteristics, as well as with other designs, such as longitudinal and clinical trials, are needed to confirm important psychometric properties, e.g., external validity and responsiveness of the PFSQ.

The Brazilian Portuguese version of the PFSQ was cross-culturally adapted for Brazilian Portuguese language since the respective steps followed the theoretical framework [14,15], that is, translation, back translation, review by experts and pretesting. The questionnaire showed to be easy for application and can be an important tool for evaluation of eating behaviors in early childhood. Nevertheless, other psychometric properties of this version need to be evaluated to ensure its effectiveness and accuracy, such as discriminant, criterion and/or correlational validity, and responsiveness.

Conclusion

Despite the different factors found by AFE related to the original PFSQ, the reliability during the validation was satisfactory, making the Brazilian Portuguese version of the PFSQ adequate to assess parental feeding style.

Authors' Contributions

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All authors declare that they contributed to critical review of intellectual content and approval of the final version to be published.

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Conflict of Interest

The authors declare no conflicts of interest.

Data Availability

The data used to support the findings of this study can be made available upon request to the corresponding author.

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