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Cross-cultural adaptation into Brazilian Portuguese and exploratory validation of two measures of emotional eating

Adaptação transcultural para o português brasileiro e validação exploratória de duas medidas de alimentação emocional

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ABSTRACT

Objective
This study aimed to cross-culturally adapt the Positive-Negative Emotional Eating Scale and the Florence Emotional Eating Drive into the Portuguese language and investigate their dimensionality (i.e., validity) for a sample of Brazilian individuals.

Methods
The cross-cultural adaptation process entailed translation, synthesis, expert committee review, pretesting, back-translation, and submission to the original authors. From the translations, synthesized versions of the measures emerged, which were evaluated by a committee of experts. Subsequently, the preliminary version was pre-tested with the target audience. A larger group of individuals completed the final Portuguese version of the instruments online, and the data were subjected to exploratory factor analysis to ascertain their dimensionality.

Results
Thirty-six individuals (female: 76.5%, mean age: 26.3±9.6 years) participated in the pretest, reporting ease in comprehending the content of both Positive-Negative Emotional Eating Scale and Florence Emotional Eating Drive. The back-translations closely resembled the originals, as confirmed by the authors of the instruments. Data from 721 individuals (female: 61.2%, mean age: 32.2±10.6 years) who completed the measures were analyzed. A two-factor model for

Positive-Negative Emotional Eating Scale demonstrated a good fit, consistent with the original proposal. For Florence Emotional Eating Drive, a three-factor model akin to the original proposal emerged, with six items loading on different factors.

Conclusion
The Positive-Negative Emotional Eating Scale and Florence Emotional Eating Drive were successfully adapted to Portuguese, with Brazilian participants indicating good understanding. The dimensionality of the measures remained consistent with the original proposals. These findings offer valuable insights for future screening protocols to foster appropriate eating behaviors.

Keywords: Eating. Emotions. Factor analysis. Feeding behavior. Measures. Translating.

RESUMO

Objetivo
O objetivo deste estudo foi adaptar transculturalmente a Positive-Negative Emotional Eating Scale e o Florence Emotional Eating Drive para a língua portuguesa e investigar sua dimensionalidade (i.e., validade) para uma amostra de brasileiros.

Métodos
O processo de adaptação transcultural envolveu tradução, síntese, revisão por comitê de especialistas, pré-teste, retrotradução e submissão aos autores originais. Das traduções surgiram versões sintetizadas das medidas, que foram avaliadas por um comitê de especialistas. Posteriormente, a versão preliminar foi pré-testada com o público-alvo. Um grupo maior de indivíduos completou online a versão final em português dos instrumentos e os dados foram submetidos à análise fatorial exploratória para verificar sua dimensionalidade.

Resultados
Trinta e seis indivíduos (feminino: 76,5%, média de idade: 26,3±9,6 anos) participaram do pré-teste, e eles relataram facilidade na compreensão do conteúdo tanto da Positive-Negative Emotional Eating Scale quanto do Florence Emotional Eating Drive. As retrotraduções se assemelharam bastante às originais, conforme confirmado pelos autores dos instrumentos. Foram analisados dados de 721 indivíduos (mulheres: 61,2%, média de idade: 32,2±10,6 anos) que completaram as medidas. Um modelo de dois fatores para a Positive-Negative Emotional Eating Scale apresentou bom ajuste, consistente com a proposta original. Para o Florence Emotional Eating Drive, surgiu um modelo de três fatores semelhante à proposta original, com seis itens carregando em fatores diferentes.

Conclusão
A Positive-Negative Emotional Eating Scale e o Florence Emotional Eating Drive foram adaptados com sucesso para o português, pois os participantes brasileiros relataram boa compreensão. A dimensionalidade das medidas permaneceu consistente com as propostas originais. Estas descobertas oferecem informações valiosas para futuros protocolos de rastreamento destinados a promover comportamentos alimentares apropriados.

Palavras-chave: *Alimentação. Emoções. Análise fatorial. Comportamento alimentar. Medidas. Tradução.*

INTRODUCTION

Emotion is an affective state that can include motor, visceral, and cognitive components. From a psychobiological perspective, a definition of emotion is any mental experience in terms of hedonic content, energy, and dominance accompanied by somatic bodily sensations [1]. Emotional activation and regulation can influence thinking, decision-making, actions, social relationships, physical and mental health, etc. The failure to deal with emotional responses is known as emotional dysregulation, which can be experienced by anyone and increases the likelihood of behavioral changes [2].

The role of emotions in eating behaviors and weight control is initially derived from psychosomatic theory, which explains whether what, when, and how it is eaten is due to emotional dysregulation [2]. There is no standardized definition of emotional eating [3], but it generally refers to the tendency to change behaviors in response to negative or positive affective states or both [4,5]. Usually, emotional eaters tend to eat more energy-dense foods as a coping mechanism

for negative emotions, probably because of early learning experiences, and this behavior leads to weight gain, binge eating, depression symptoms, and lower self-esteem [6,7]. Of note, positive emotional eating does not necessarily reflect disordered eating [8], but when the behavior occurs in succession, it may alter the desire to eat, leading to increased consumption [9-11]. Moreover, different emotions may increase or decrease eating in the same group of people [4], and positive and negative emotional eating might co-occur in some individuals [12].

Given the impact of emotional eating on people's lives, evaluating this construct is a useful marker for identifying early disordered eating behavior [5,13]. Psychological measures play an essential role in such evaluation. Different self-report measures can help to investigate emotional eating [12,14-19], and some address a broader spectrum of the construct. In this way, the Positive-Negative Emotional Eating Scale (PNEES) [10] and the Florence Emotional Eating Drive (FEED) [15] are emerging. Importantly, although the PNEES and FEED have been designed to assess emotional eating, they use different perspectives.

The PNEES [10] aims to assess eating in response to both positive and negative emotions reflecting real life. The scale was constructed in an Estonian context to fill the gap in the literature as most measures focus on negative emotions. The nineteen items were developed based on a pre-existing affect measure, emotional eating scales, and experimental studies, including binge eating emotions. Based on data from women, the authors published the original article showing a two-factor model for the scale, which showed good internal consistency and significant correlations with eating disorders and affect measures.

The FEED [15] explores the occurrence of specific emotions and the association between these emotions and the desire to eat, aiming to be useful measure in a clinical context. The questionnaire was constructed in an Italian context. The twenty-three items were developed on the basis of a pre-existing emotional eating measure and tests with volunteers were conducted. The psychometric analysis presented in the original article showed that the FEED has three dimensions with good reliability and adequate convergent validity with other measures [15].

The operationalization of the dimensional structure of both PNEES and FEED in samples from other parts of the world is incipient or unknown. So, knowing this is important because both measures can expand the possibilities for assessing emotional eating behavior in the general population [6], as well as helping to characterize the profiles of patients affected by dysfunctional eating behavior, benefiting planning interventions [10,15]. Thus, the present study aimed to carry out the cross-cultural adaptation of the PNEES and FEED into Brazilian Portuguese and to investigate their dimensionality with people aged ≥18 years.

METHODS

Study Design and Sample

This is a cross-sectional study with a non-probabilistic sample. The sample size was arbitrarily calculated according to specialized literature [20], considering the need for 20 individuals for each item of the measure with the largest number of items (i.e., the FEED). Therefore, the minimum sample size was calculated for 460 people.

Participants

Brazilians aged ≥18 years were invited. The inclusion criteria were as follows: people who were literate in Portuguese and native to Brazil. Exclusion criteria were pregnant or puerperal

women, individuals unable to complete the online form without help or assistance, those without autonomy to choose their own food, and those undergoing treatment for diseases that significantly affect the diet.

The PNEES [10] has 19 items, a 5-point Likert-type response scale (0=never, 4=very often), and two correlated dimensions (negative and positive emotional eating). The sum of the responses to the items in each dimension results in scores, which the higher they are, the greater the chance of emotional eating behavior.

The FEED [15] has 23 items, which is completed using two 5-point Likert-type response scales ([i] frequency of the emotion: 0=never, 4=always; [ii] desire to eat: 0=no desire to eat, 4=an overwhelming urge to eat). Originally, the questionnaire had three correlated dimensions (depression; anger; anxiety). The authors created a scoring procedure that recodes the scores from both response scales on a 10-point scale ranging from 0 (absence of the urge to eat in the presence of that emotion) to 9 (urge to eat for an emotion). This weighting algorithm was used.

To characterize the sample, participants self-reported their age, gender, race/ethnicity, height, weight, region living in the country, marital status, monthly income in Brazilian minimum wage (in 2024 was 278.99 US dollars), and education.

Procedures

Data collection was carried out online between November 2022 and August 2023 using a form of Google Forms. First, the study was announced among students, professors, and employees of different higher education institutions in Brazil via email, social media, and face-to-face. In the announcements, we asked participants to share the link to the form with their peers (snowball sampling). Participation in the study was voluntary, and the individual could withdraw at any time.

The study followed the Brazilian Resolution 466 of Guidelines and Regulations for Research Involving Human Beings. All participants agreed to the Free and Informed Consent Form. The Ethics Committee of the Army Physical Training Center approved the study (CAAE 58840922.6.0000.9433).

Cross-Cultural Adaptation

We followed the guidelines of Beaton et al. [21] to carry out the cross-cultural adaptation as follows. The English version of each measure was translated into Portuguese by two bilingual translators whose native language was Brazilian Portuguese. The two translators and an observer (researcher of this study) got together to synthesize the Portuguese versions produced for each measure during the translation stage, aiming to build a single version (preliminary). Two methodologists, two health professionals, a language professional, and the translators (expert committee review) consolidated all the versions of each measure and developed a pre-final version. This was administered to a sample of individuals from the target population to verify its adequacy. Participants were interviewed by a researcher to understand how they perceived the content of the measures. Each participant also completed the Usability Evaluation Questionnaire [22] to assess how easy it was to understand the measures. Afterward, the Portuguese version of each measure was translated into English to verify its similarity to the original. This was carried out by two native English speakers. Finally, we sent the Portuguese version and the back-translations of each measure to one of the original authors (a.k.a developer) as a form of process audit.

Exploratory Factor Analysis

The PNEES and FEED were submitted to exploratory factor analysis to assess their dimensionality. As the PNEES has a 5-point response scale, the analysis used a polychoric matrix with the Robust Diagonally Weighted Least Squares extraction method. For the FEED, the extraction method was Maximum Likelihood, as it has a 10-point final response scale. The interpretability of the item correlation matrix was ensured based on the significance of Bartlett's test for sphericity (p<0.05) and the Kaiser-Meyer-Olkin (KMO) test ≥0.70 [23]. The number of factors to be retained was based on the original study of each measure (PNEES=two; FEED=three) and the technique used was parallel analysis with random permutation of the observed data. The rotation used was Robust Promin. Factor loadings <0.30 were suppressed due to low contribution to the factor. The goodness-of-fit indices: Non-Normed Fit Index (cutoff point used: NNFI>0.95), Comparative Fit Index (cutoff point used: CFI>0.95), and Root Mean Square Error of Approximation (cutoff point used: RMSEA<0.08) were analyzed [24]. The stability of each factor was assessed using the H-index with values >0.80 suggesting that the latent variable is more likely to be stable across different studies [23]. The Unidimensional Congruence (UniCo), the Explained Common Variance (ECV), and the Mean of Item Residual Absolute Loadings (MIREAL) were analyzed to investigate the possibility of the measure being unifactorial. When UniCo>0.95, ECV>0.85, and MIREAL<0.30 a unifactorial structure could be plausible [23]. The analyses were performed using the Factor software (v. 12.04.05).

RESULTS

Cross-Cultural Adaptation

For the PNEES, the content of twelve items, as well as the title and response options, were identical between translators. However, the translation of the word "angry" (item 15) was presented by the translator 2 (T2) as "*nervoso(a)*" and by the translator 1 (T1) as "*com raiva*", the latter being considered more appropriate. The word "guilty" (item 18) was translated by the T1 as "*acolchoado*" and by the T2 as "*culpado(a)*", the latter being retained. The word "excited" (item 14) was translated by T1 as "*excitado*" and by T2 as "*animado(a)*", the latter being accepted as better. Regarding the translation of the words "drives" (items 6, 7, 17, 19) and "desire" (items 5, 9, 18) into Portuguese, similarities and disagreements were observed between the translators. After consulting specialized literature, we considered that the most appropriate would be to use "*desejo*" as a translation for "desire" and "*me leva a*" as a translation for "drives".

For the FEED, the content of fifteen items and instructions were identical between translators. The response option "a few times" was translated by T1 as "*poucas vezes*", but the translation by T2 as "*quase nunca*" was considered more appropriate. The word "drive" presented in the beginning sentence of the second phase of responses to the questionnaire was translated by both translators as "*desejo*", which was maintained to match response options. In the items, the word "discouraged" (item 2) was translated as "*desanimado*" by the T1 and as "desmotivado(a)" by the T2. The synthesis committee decided to use "*desencorajado(a)*", considered more appropriate. Other committee decisions were: "shaky" (item 3) as "*instável*"; "worn out" (item 4) as "*exausto(a)*"; "*inadequate*" (item 5) as "*inadequado*"; "blue" (item 7) as "*melancólico(a)*"; "jittery" (item 8) as "*agitado(a)*"; "jealous" (item 12) as "*enciumado(a)*"; and "angry" (item 20) as "*bravo(a)*".

In a second round, the committee changed item 11 of the PNESS using "desamparado(a)" as a translation for "helpless"; In the FEED, "*trêmulo(a)*" and "*ansioso(a)*" were used respectively as translations for "shaky" (item 3) and "jittery". Furthermore, the title of the FEED was changed to "*Questionário de Florença sobre Frequência de Emoções e Desejo de Comer*", considered better culturally adapted. Importantly, T2 included 'a' at the end of some words of the items and this was allowed. Also, the T2 used the personal pronoun at the beginning of sentences. Thus, a Portuguese pre-final version of each measure was obtained, which went into the pretest.

The pre-test participants were 36 Brazilians (76.5% female, mean age of 26.3±9.6 years). Participants completed the measures, and most of them agreed that it was easy to understand the instructions (FEED: 69.4% totally agree), items (PNEES: 81.1% totally agree; FEED: 72.4% totally agree), and response options (PNEES: 70.3% totally agree; FEED: 75.3% totally agree). Therefore, the Portuguese versions were considered adequate and were back-translated. These were sent to the original authors, who were aware of and previously authorized the cross-cultural adaptation. Charts 1 and 2 show the Brazilian Portuguese final version of each measure.

Exploratory Factor Analysis

In this phase, 721 individuals (61.2% female) completed the final Portuguese version of the PNEES and FEED, and demographics items. The mean age was 32.2±10.6 years, and the mean body mass index was 26.1±5.1 kg/m2. Most participants reported living in the Southeast region of Brazil (73.9%), being single (53.5%), having a monthly income between 2 and 6 minimum wages (34.9%), having completed higher education (70.1%), and being white (62.3%).

Chart 1 – Portuguese version cross-culturally adapted for Brazil of the Positive-Negative Emotional Eating Scale. Araraquara (SP), Brazil, 2022-2023.

Escala de Alimentação Emocional Positiva-Negativa (PNEES)					
	Opções de resposta				
	0 nunca	*1*	*2*	*3*	*4 muitas vezes*
1. Eu costumo comer quando estou mal-humorado(a).					
2. Eu tenho uma tendência para comer quando estou chateado(a).					
3. Quando me sinto ativo(a) e motivado(a), tenho uma tendência para comer.					
4. Eu costumo comer quando estou decepcionado(a).					
5. Eu tenho um desejo de comer quando estou alegre.					
6. Sentir-me irritado(a) me leva a comer.					
7. Sentir-me tenso(a) ou ansioso(a) me leva a comer.					
8. Eu tenho uma tendência para comer quando me sinto triste.					
9. Eu tenho um desejo de comer quando estou cheio(a) de energia.					
10. Eu sinto vontade de comer quando estou satisfeito(a) comigo mesmo(a).					
11. Quando me sinto desamparado(a), quero comer.					
12. Quando me sinto inquieto(a), tenho uma tendência para comer.					
13. Eu sinto vontade de comer quando estou ofendido(a).					
14. Eu costumo comer quando fico animado(a) com alguma coisa.					
15. Eu sinto vontade de comer quando estou com raiva.					
16. Eu tenho uma tendência para comer quando me sinto solitário(a).					
17. Sentir-me confiante me leva a comer.					
18. Quando me sinto culpado(a), tenho um desejo de comer.					
19. Fascinar-me por algo me leva a comer.					

Chart 2 – Portuguese version cross-culturally adapted for Brazil of the Florence Emotional Eating Drive. Araraquara (SP), Brazil, 2022-2023.

Questionário de Florença sobre Frequência de Emoções e Desejo de Comer (FEED)										
Instruções: Todos nós respondemos a diferentes emoções com comportamentos diferentes. Algumas emoções podem desencadear em nós o desejo de comer ou de sentir fome. Por favor, indique com que frequência você sente as emoções relatadas abaixo e o quanto tais emoções o(a) levam a comer ou ao desejo de comer. Ao responder as perguntas você contribuirá para a validação do questionário. Seus dados serão tratados como estritamente confidenciais. Por favor, informe os dados solicitados nos campos abaixo. Suas informações serão usadas para criar uma identificação pessoal para o gerenciamento adequado de dados. Obrigado por sua cooperação. *Gênero: ( ) Homem ( ) Mulher ( ) Outro / Idade:___ Escolaridade:___ Estado civil:___ Iniciais do nome da mãe:___* *Os 3 últimos dígitos do seu número de celular:___*										
	Opções de resposta									
	Com que frequência você se sente...?					*O quão forte é seu desejo de comer quando você se sente...?*				
	Nunca	*Quase nunca*	*Às vezes*	*Frequentemente*	*Sempre*	*Nenhum desejo de comer*	*Um pequeno desejo de comer*	*Um moderado desejo de comer*	*Uma vontade forte de comer*	*Uma vontade imensa de comer*
1. Ressentido(a)										
2. Desencorajado(a)										
3. Trêmulo(a)										
4. Exausto(a)										
5. Inadequado(a)										
6. Rebelde										
7. Melancólico(a)										
8. Ansioso(a)										
9. Triste										
10. Inquieto(a)										
11. Irritado(a)										
12. Enciumado(a)										
13. Preocupado(a)										
14. Frustrado(a)										
15. Solitário(a)										
16. Furioso(a)										
17. No limite										
18. Confuso(a)										
19. Nervoso(a)										
20. Bravo(a)										
21. Culpado(a)										
22. Entediado(a)										
23. Chateado(a)										

A seguir é apresentado o procedimento de pontuação para recodificações de ambas as escalas de resposta do FEED para uma única escala de 10 pontos variando de 0 a 9.

		O quão forte é seu desejo de comer quando você se sente...?				
		Nenhum desejo de comer: 0	*Um pequeno desejo de comer: 1*	*Um moderado desejo de comer: 2*	*Uma vontade forte de comer: 3*	*Uma vontade imensa de comer: 4*
Com que frequência você se sente...?	*Nunca: 0*	0	0	0	0	0
	Quase Nunca: 1	0	1	2	3	4
	Às vezes: 2	0	2	4	5	6
	Frequentemente: 3	0	3	5	7	8
	Sempre: 4	0	4	6	8	9

For both measures, Bartlett's sphericity test (PNEES: 8206.8, df=171, $p<0.001$; FEED: 8191.4, $df=253$, $p<0.001$) and KMO (PNEES: 0.93; FEED: 0.96) suggested interpretability of the item correlation matrix. Table 1 presents the loading of the items in the dimensions found for each measure.

Table 1 – Factor loadings obtained via exploratory factor analysis determining the dimensions of the Positive-Negative Emotional Eating Scale and of the Florence Emotional Eating Drive for the data under investigation. Araraquara (SP), Brazil, 2022-2023.

Item	Loading		
	Factor 1	Factor 2	Factor 3
Positive-Negative Emotional Eating Scale (PNEES)			
1) ... I am grumpy	**0.849**	-0.015	
2) ... I am upset	**0.979**	-0.030	
3) When I am feeling active and motivated...	-0.095	**0.835**	
4) ... I am disappointed	**0.971**	-0.023	
5) ... I am joyful	0.086	**0.831**	
6) Feeling irritated...	**0.878**	-0.014	
7) Feeling tense or anxious...	**0.896**	-0.124	
8) ... I am sad	**0.960**	-0.035	
9) ... I am full of energy	-0.066	**0.952**	
10) ... I am content with myself	-0.138	**0.923**	
11) When I am feeling helpless...	**0.928**	-0.015	
12) When I am feeling restless...	**0.709**	0.082	
13) ... I am offended	**0.779**	0.092	
14) ... I get excited about something	0.043	**0.936**	
15) ... I am angry	**0.816**	0.029	
16) ... I am feeling lonely	**0.754**	0.042	
17) Feeling confident...	0.018	**0.907**	
18) When I am feeling guilty...	**0.788**	0.047	
19) Being fascinated about something...	0.082	**0.742**	
H-index	0.992	0.987	
Florence Emotional Eating Drive (FEED)			
1) Resentful	**0.783***	0.190	-0.168
2) Discouraged	**0.764**	0.138	-0.127
3) Shaky	-0.149	0.111	**0.314**
4) Worn out	0.014	0.240	**0.377**
5) Inadequate	**0.709**	0.042	-0.122
6) Rebellious	0.133	0.335	-0.004
7) Blue	**0.846***	-0.132	0.038
8) Jittery	0.134	-0.096	**0.750***
9) Sad	**0.823**	-0.122	0.105
10) Uneasy	-0.274	0.016	**0.961***
11) Irritated	0.056	**0.663**	0.159
12) Jealous	0.190	**0.444***	-0.196
13) Worried	0.180	0.133	**0.446**
14) Frustrated	**0.638**	-0.016	0.219
15) Lonely	**0.592**	-0.069	0.174
16) Furious	-0.144	**0.981**	-0.185
17) On edge	0.099	**0.342**	0.243
18) Confused	0.235	**0.331***	0.119
19) Nervous	-0.061	**0.676**	0.221
20) Angry	-0.102	**0.978**	-0.074
21) Guilty	**0.647**	0.056	0.001
22) Bored	0.049	-0.113	**0.683**
23) Upset	**0.650**	0.160	0.034
H-index	0.967	0.958	0.948

Note: Item loadings on the corresponding factor are presented in bold. *Indicates item loaded in a different factor than the original proposal. PNEES: Factor 1: negative emotional eating; Factor 2: Positive emotional eating. FEED: Factor 1: depression; Factor 2: anger; Factor 3: anxiety.

For the PNEES, the parallel analysis extracted two dimensions with a cumulative proportion of variance of 73.9% and a good fit (NNFI=0.94, CFI=0.95), except for the RMSEA, which was 0.19. This structure was identical to the original. For the FEED, three dimensions were extracted with a cumulative proportion of variance of 56.7% and a good fit (NNFI=0.98, CFI=0.98, RMSEA=0.06). This structure was similar to the original proposal of the questionnaire, with most of the items loading on their appropriate factors. Six items loaded on different factors than in the original.

The H-index suggested that all factors of the measures were likely to be stable across further studies (see Table 1). Concerning the possibility that the structure of the measure is unifactorial, this was shown for the FEED (UniCo=0.97, ECV=0.87, MIREAL=0.21), but not for PNEES (UniCo=0.76, ECV=0.67, MIREAL=0.41).

DISCUSSION

We cross-culturally adapted the PNEES and the FEED to the Brazilian context and showed their dimensionality. These measures can contribute to broadening the possibilities of assessing emotional eating behavior, benefiting future Brazilian protocols.

The cross-cultural adaptation was performed according to international guideline [21] to achieve content validity. Hence, we conducted a detailed process involving the attainment of semantic, idiomatic, experiential, and conceptual equivalence between the original and Brazilian Portuguese versions. At the translation stage, most of the items of both measures were equally translated by the interpreters, demonstrating semantic and idiomatic equivalence [21]. When there was disagreement, the synthesis committee analyzed indicating a more parsimonious way. This contributed to the content of the measures being well understood by the target audience. Importantly, all changes made to the content of each measure aimed to achieve a set of equivalences between source and target [21], which was carried out by experts in different areas of knowledge.

Also, we performed an exploratory factor analysis to identify any latent variables that cause the manifest variables to covary. The initial tests indicated the plausibility of interpreting the item correlation matrix, showing our sample's adequacy. To the extent of our knowledge, this is the first study that investigates the dimensionality of PNEES and FEED using Brazilian data. Confirming the original study [10], the Brazilian data also suggested that the PNEES items are distributed across two dimensions with a good percentage of variance explained. Manchón and colleagues [9] fitted the original two-factor model of the PNEES to the Spanish data using confirmatory factor analysis. These findings, which are associated with the high probability of replicability of the latent variables and the rejection of a unidimensional structure found in the present study, strengthen the PNEES two-factor model. As people can eat when faced with positive and/or negative emotions, the PNEES becomes a promising measure for future protocols by endorsing both states [10]. It is worth mentioning that the RMSEA did not reach the desired cutoff value, but this does not represent, per se, a poor fit [25].

Regarding the FEED, the exploratory analysis reached three dimensions, resulting in agreement with the original study. However, the Brazilian data revealed a different loading for six items compared to the original, where item 1 (resentful/"*ressentido*") is part of the anger factor, and item 7 (blue/"*melancólico*") is part of the anxiety factor, but both items in the present study loaded the depression factor. Duarte and Pinto-Gouveia [26], testing another measure of emotional eating, found that blue emotion loaded on a factor named depression, corroborating our results. A blue state like melancholy and resentment are signs that can be part of the symptoms of depression according to the Diagnostic and Statistical Manual of Mental Disorders [27], justifying our results.

In the original FEED study, item 8 (jittery/"*ansioso*") is part of the anger factor, and item 10 (uneasy/"*inquieto*") is part of the depression factor, but in the present study, both items loaded on the anxiety factor. Arnow and colleagues [28], when developing one of the first measures of emotional eating, found that jittery and uneasiness loaded on the anxiety factor, corroborating our findings. In line, anxiety disorder endorses a range of signs and symptoms that may include uneasiness [27]. Still, Ahlich and colleagues [3] examined the heterogeneity of the emotions and dysregulated eating behaviors across American adults and found that jittery was an item that was dropped in most cases due to weak loadings or high cross-loadings. This may have occurred because the item labeled anxious was also endorsed among the emotions examined to establish the latent factors.

In the original FEED study, item 12 (jealous/"*enciumado*") is part of the anxiety factor, and item 18 (confused/"*confuso*") is part of the depression factor, but both items in the present study carried the anger factor. The findings of Arnow et al. [28] support some of our results, as jealousy loaded on the anger factor and confusion loaded on both the anger and anxiety factors. An experimental study [29] showed that, in the context of romantic couples, having meals with someone provoked more jealousy than face-to-face interactions, which could generate feelings of discomfort, such as anger. Furthermore, because the effects of anger on eating may be driven by different arousals, a confused state could be supported.

Still, regarding the distribution of items by FEED factor identified in this study, it is important to emphasize that subtle cultural differences may present challenges for effective communication about emotions. In this way, the differences between the Brazilian study and the original FEED can represent the cultural reality of each context. Another explanation is based on exploratory factor analysis, which by nature and design is just a search technique to form groupings based on data [30]; therefore, future analyses (e.g., confirmatory) should be conducted to verify if the structure found in the present study is replicated in other samples/contexts. Furthermore, our results also suggest that FEED can be a unidimensional measure that should be tested in the future.

Limitations and Strengths

Regarding the limitations, there are different guidelines to follow when carrying out a cross-cultural adaptation, and we chose to use a unique international protocol based on different components. As Brazil is a large country with people of different characteristics and regional cultures, local adaptations can be fruitful before applying PNEES and FEED anywhere. Also, we used as a source the English version available in the article that developed each measure, as suggested by the original authors; however, PNEES was originally produced in an Estonian context and FEED in an Italian context. Although this may have influenced the content, the items of both measures were derived from other measures [28] already consolidated in English with the same/similar content.

Strengths include the fact that the study adds to the body of measures available to assess eating behavior driven by emotional states in specific populations in Brazil. The availability of different measures – contemporary and newly created – opens the possibility for researchers and clinicians to choose the most appropriate for their protocol. Furthermore, we have been able to present psychometric properties on the dimensionality of the PNEES and FEED, stimulating future studies to confirm those structures designed to track emotional eating, which can benefit research and therapeutic interventions.

As this study adapted two measures of emotional eating into Brazilian Portuguese, the following question is supposed to arise: What is the most appropriate measure to use? The answer

depends on the objective and application context (e.g., research; clinical). There are advantages and disadvantages to both measures. The PNEES consists of a reduced number of items (19), but each item represents an affirmative sentence, which demands greater cognitive processing from the respondent to analyze the content. The FEED has 23 items, each of which refers to an emotion that is answered regarding its frequency of occurrence and related to eating, summarizing 46 responses. On the other hand, FEED items are simple, containing only words that represent emotions, which can help different groups of people understand them easily. In view of these arguments, FEED can be useful in a clinical context, while PNEES can be useful in a research context. If the protocol aims to assess positive and negative emotions simultaneously, the PNEES is more appropriate. Furthermore, both PNEES and FEED can be administered in the same study to analyze convergent/concurrent validity since they evaluate constructs that are supposed to be similar. Importantly, these are only suggestions for future evaluations.

CONCLUSION

The cross-cultural adaptation of the PNEES and FEED into Portuguese was carried across different stages until an adapted version of each measure was considered adequate for the Brazilian context of investigation. Two promising measures are now available to help assess the emotional eating behavior of people aged ≥18 years in the country. The original two-dimensional structure of the PNEES was confirmed with Brazilian data. On the other hand, the original three-dimensional structure of FEED, despite having emerged, needs to be confirmed, as there was evidence of a different distribution of six items and the possibility of it being a unidimensional measure. Therefore, we encourage future studies with the PNEES and/or FEED to confirm the validity and reliability of the data obtained from the Portuguese version.

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