

Cross-Cultural Adaptation and Psychometric Validation of FEEDME Instruments for Brazilian Residents

Carlos Dario Silva Costa

`carlos.costa@edu.famerp.br`

Center for Studies and Development of Health Education – Faculty of Medicine of São José do Rio Preto (CEDES / FAMERP)

Salvador André Bavaresco Cristovão

Beneficência Portuguesa de São Paulo

Gabriela Gouvea Silva

Center for Studies and Development of Health Education – Faculty of Medicine of São José do Rio Preto (CEDES / FAMERP)

Emerson Roberto Santos

Center for Studies and Development of Health Education – Faculty of Medicine of São José do Rio Preto (CEDES / FAMERP)

João Daniel De Souza Menezes

Center for Studies and Development of Health Education – Faculty of Medicine of São José do Rio Preto (CEDES / FAMERP)

Matheus Querino Silva

Faculdade de Medicina de São José do Rio Preto

Leonila Santos de Almeida Sasso

Center for Studies and Development of Health Education – Faculty of Medicine of São José do Rio Preto (CEDES / FAMERP)

Ana Maria Rita Pedroso Vilela Torres de Carvalho Engel

Center for Studies and Development of Health Education – Faculty of Medicine of São José do Rio Preto (CEDES / FAMERP)

Paula Helena Gonçalves Cristovão

Hospital do Servidor Público Estadual

Thalissa Catricala

Center for Studies and Development of Health Education – Faculty of Medicine of São José do Rio Preto (CEDES / FAMERP)

Simone Andreia Gubolin

University Center from Northern of São Paulo (UNORTE)

Rauer Ferreira Franco

Center for Studies and Development of Health Education – Faculty of Medicine of São José do Rio Preto (CEDES / FAMERP)

Lais Fernanda Amorin

Educational Group Michelin Educational Center (UNITERP)

Emília Batista Mourão Tiol

Center for Studies and Development of Health Education – Faculty of Medicine of São José do Rio Preto (CEDES / FAMERP)

Maicon José de Jesus Vijarva

Center for Studies and Development of Health Education – Faculty of Medicine of São José do Rio Preto (CEDES / FAMERP)

Luís Cesar Fava Spessoto

Faculdade de Medicina de São José do Rio Preto

Izaura dos Santos Ramos

Center for Studies and Development of Health Education – Faculty of Medicine of São José do Rio Preto (CEDES / FAMERP)

Denise Cristina Móz Vaz Oliani

Faculdade de Medicina de São José do Rio Preto

Júlio César André

Center for Studies and Development of Health Education – Faculty of Medicine of São José do Rio Preto (CEDES / FAMERP)

Antonio Hélio Oliani

Faculdade de Medicina de São José do Rio Preto

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Abstract

Background

This study aimed to translate, cross-culturally adapt, and psychometrically validate the FEEDME-Culture and FEEDME-Provider instruments for Brazilian Portuguese in medical education. Given increasing cultural diversity and a gap in validated feedback perception instruments in Brazil, rigorous adaptation is essential for validity and comparability.

Methods

This methodological, cross-sectional study followed international adaptation guidelines. The process involved initial translation, synthesis, back-translation, multidisciplinary expert committee evaluation (semantic, idiomatic, experiential, conceptual, item, operational equivalences), and a 15-resident cognitive debriefing pre-test.

Results

Psychometric properties were assessed in Brazilian residents ($n = 64$ for FEEDME-Culture; $n = 71$ for FEEDME-Provider). Composite reliability showed excellent internal consistency (0.866–0.939) for all factors. Confirmatory factor analysis confirmed two-factor correlated structure for FEEDME-Culture (Feedback Characteristics, Feedback Delivery) and three-factor correlated structure for FEEDME-Provider (Feedback Provider Characteristics, Feedback Exchange, Feedback Quality), both statistically superior to unidimensional models. Global fit indices were satisfactory, with FEEDME-Culture's root mean square error of approximation slightly exceeding the cutoff. High factor correlations indicate significant conceptual overlap.

Conclusions

This study provides robust evidence of construct validity, reliability and internal consistency for the adapted FEEDME versions in Brazil, supporting their transcultural applicability. High factor correlations and minor fit deviations suggest subtle cultural nuances influencing item interpretation. Generalizability is limited by small sample sizes and specific participant demographics. These instruments are recommended as promising tools for researchers and educators to assess feedback perception in medical education, fostering effective interventions and cross-cultural research.

1. Background

Globalization increasingly drives multinational and multicultural research, particularly in Social Sciences and Education, necessitating rigorous adaptation of psychometric instruments across languages and

cultures [1, 2]. Most widely used questionnaires are originally English-developed, limiting their direct application in diverse contexts, even within the same language, due to cultural nuances influencing interpretation and response [3]. Global migratory flows further emphasize the need for culturally sensitive and transculturally applicable assessment tools [1]. In education, quality feedback is vital for professional development [4], yet validated instruments for trainees' feedback perception, addressing cultural and contextual nuances, are lacking in Brazil.

This study addresses this gap by adapting and validating the FEEDME-Culture (Feedback in Medical Education-Culture) and FEEDME-Provider (Feedback in Medical Education-Provider) instruments, originally developed by Bing-You et al. (2018) in the United States. A comprehensive literature search confirmed no prior adaptation for Brazilian Portuguese. The FEEDME-Culture evaluates the feedback culture of a learning environment (frequency, characteristics, delivery), while the FEEDME-Provider focuses on specific feedback provider characteristics, exchange quality, and overall feedback quality. Both dimensions are crucial for understanding feedback reception and utilization, directly impacting educational effectiveness. Cultural perceptions of 'effective' feedback necessitate adaptation to maintain conceptual validity in the Brazilian context [6].

Cross-cultural adaptation extends beyond linguistic translation; it's a comprehensive process ensuring semantic, idiomatic, experiential, and conceptual equivalence [2, 7]. This equivalence is paramount for valid cross-cultural comparisons in health and education, where concepts can vary significantly [1, 3]. To guide this process, Guillemin et al. (1993) proposed a typology of scenarios. As shown in Table 1, Scenario E applies to this study, as it involves adapting instruments from English to Portuguese in a different country with significant cultural differences, necessitating both translation and cultural adaptation.

Table 1
Scenarios for cross-cultural adaptation of questionnaires

(adapted from Guillemin et al.(1993))

Scenario	New population description	Results in a change in...			Adaptation needed	
		Culture	Language	Country of use	Translation	Cultural adaptation
A	Use in the same population. No change in culture, language, or country relative to the source.	No	No	No	No	No
B	Use in immigrants established in the country of origin (source).	Yes	No	No	No	Yes
C	Use in another country, but with the same language.	No	No	Yes	No	Yes
D	Use in new immigrants, not speaking the source language, but in the same country of origin (source).	Yes	Yes	No	Yes	Yes
E	Use in another country and in another language.	Yes	Yes	Yes	Yes	Yes

Crucially, adaptation alone does not guarantee retention of psychometric properties. Post-adaptation psychometric testing is essential to confirm that the adapted instrument measures the same construct with similar accuracy and consistency in the new cultural environment [1, 2, 9]. This study details the comprehensive process undertaken to ensure the FEEDME instruments' utility in Brazilian medical education.

2. Methods

This study employed a cross-sectional, methodological design to translate, cross-culturally adapt, and psychometrically validate the FEEDME-Culture and FEEDME-Provider instruments for Brazilian Portuguese. The original instruments, developed by Bing-You et al. (2018), assess feedback perception in medical education. FEEDME-Culture comprises 16 items plus one global item, measuring two correlated factors: Feedback Characteristics (Q1-Q10) and Feedback Delivery (Q11-Q16). FEEDME-Provider includes 13 items plus one global item, measuring three correlated factors: Feedback Provider

Characteristics (Q1-Q5), Feedback Exchange (Q6-Q9), and Feedback Quality (Q10-Q14). Both use a 5-point Likert scale.

2.1 Cross-cultural adaptation process

The adaptation strictly followed Beaton et al. (2000) and Alavi et al. (2026) guidelines, as outlined in the flowchart (Fig. 1) and timeline (Table 2).

Table 2
Timeline of the cross-cultural adaptation and validation process

Study stage	Period	Activities description	Documentation
2.2.1. Initial translation	07/01/2024 to 07/15/2024	Translation of original instruments (English) to Brazilian Portuguese by two independent translators (T1 ^a and T2 ^b).	T1 and T2 reports
2.2.2. Synthesis of translations	07/16/2024 to 07/31/2024	Translators meeting to reconcile versions and create synthesis versions (T-12 ^c).	T-12 consensus report
2.2.3. Back-translation	08/01/2024 to 08/20/2024	Back-translation of T-12 versions to English by two independent back-translators (BT1 ^d and BT2 ^e).	BT1 and BT2 reports
2.2.4. Expert committee	08/21/2024 to 09/15/2024	Multidisciplinary analysis of equivalences (semantic, idiomatic, experiential, conceptual, item, operational) and adjustments.	Committee report
2.2.5. Pretest of pre-final version	09/16/2024 to 10/15/2024	Pilot application to 15 residents and semi-structured interviews (cognitive debriefing).	Pretest report
2.2.6. Coordinating committee approval	12/02/2024	Formal approval of the final adapted versions of the instruments.	Consolidated coordinating committee approval report
2.3. Psychometric evaluation	01/02/2025 to 10/31/2025	Data collection from the main sample for FEEDME ^f -Culture (n = 64) and FEEDME-Provider (n = 71) and application of reliability and validity analyses.	Statistical analysis results
2.4. Score adjustment for cultural context	During 2.2.4 and 2.2.5	Qualitative Differential Item Functioning considerations, response pattern comparison, and operational/format adequacy.	Committee report, pretest report

Study stage	Period	Activities description	Documentation
^a Translator 1			
^b Translator 2			
^c Synthesis versions of translator 1 and translator 2			
^d Back-translator 1			
^e Back-translator 2			
^f Feedback in medical education			
Detailed steps included:			

1. Initial translation:

Two independent translators (T1: linguist with health background; T2: linguist, blinded to construct) translated instruments from English to Brazilian Portuguese. Semantic discrepancies and idiomatic expressions were documented.

2. Synthesis of translations:

T1 and T2 converged their versions into T-12, resolving discrepancies by consensus.

3. Back-translation:

Two independents, blinded native English speakers back-translated the T-12 versions to English, ensuring fidelity to original meaning.

4. Expert committee:

A multidisciplinary committee (three psychometricians, two health/education specialists, one linguist, one sworn translator) reviewed all translations and reports. They assessed semantic, idiomatic, experiential, conceptual, item, and operational equivalences. Specific item reformulations were made for naturalness and cultural relevance (e.g., FEEDME-Culture Q2, Q6, Q14, Q15; FEEDME-Provider Q3, Q9, Q11) after qualitative discussion of potential Differential Item Functioning (DIF). Operational equivalence ensured appropriate format, instructions, and administration methods for the Brazilian context.

5. Pretest:

The pre-final versions were administered to 15 surgical residents. Cognitive debriefing via semi-structured interviews clarified item comprehension, instruction clarity, and cultural relevance, leading to final adjustments.

6. Documentation Submission:

Formal approval occurred on December 2, 2024, and final adapted versions were made available on Open Science Framework (OSF) (<https://osf.io/bz9xd/overview>) and in Additional file 1.

2.2 Psychometric properties evaluation

2.2.1 Participants and sampling:

All residents of the service were invited between January 2, 2025, and October 31, 2025. Questionnaires were self-administered. Sample sizes were $n = 64$ for FEEDME-Culture and $n = 71$ for FEEDME-Provider. Given the exploratory nature and small sample, a non-traditional Confirmatory Factor Analysis (CFA) approach was chosen.

2.2.2 Statistical analysis:

Analyses were performed using R (v4.5.1) with psych, lavaan, and Matrix packages.

2.2.3 Reliability:

Composite reliability (ρ_c) was used, with values $\geq .60$ considered adequate.

2.2.4 Construct validity:

CFA was employed. Goodman-Kruskal Gamma correlation matrices were calculated for ordinal items. Matrix smoothing (nearPD) ensured positive semi-definiteness. Shrinkage ($\lambda = .11$) was applied to FEEDME-Provider to address identification issues. Asymptotic covariance matrix was estimated via bootstrapping (500 samples). Factorial parameters were estimated using Unweighted Least Squares Adjusted Mean-Variance (ULSMV), suitable for small samples and categorical data.

2.2.5 Models tested:

For FEEDME-Culture, a unidimensional model and a two-factor correlated model were tested. For FEEDME-Provider, a unifactorial model and a three-factor correlated model were tested.

2.2.6 Fit criteria:

Model fit indices included Comparative Fit Index (CFI) $\geq .90$ and Root Mean Square Error of Approximation (RMSEA) $< .08$ (with upper IC $\leq .10$). Robust CFI and RMSEA were utilized.

2.2.7 Model comparison:

Nested models were compared using Satorra [10] robust scaled chi-square difference test.

2.2.8 Item-level analysis:

The percentage distribution of responses for items was examined, as well as the Goodman-Kruskal Gamma correlations between items.

2.2.9 Measurement equivalence:

Evaluation of measurement equivalence was conducted through comparisons between factorial models using robust chi-square difference tests.

2.3 Cultural score adjustment

Qualitative DIF discussions during the expert committee stage and cognitive debriefing during the pre-test were instrumental in adjusting items for cultural sensitivity and appropriate interpretation, alongside operational equivalence considerations for format and layout.

3. Results

3.1 Sample description

The initial validation sample for FEEDME-Culture (n = 64) was predominantly male (62.5%, n = 40) and older than 31 years (79.7%, n = 51). The FEEDME-Provider sample (n = 71) also had more males (57.7%, n = 41) and a majority aged over 31 (83.1%, n = 59).

3.2 Cross-cultural adaptation findings

The adaptation process rigorously followed Beaton et al. (2000) guidelines, ensuring semantic, idiomatic, experiential, and conceptual equivalences. Initial independent translations showed high agreement, with minor discrepancies resolved by consensus. Back-translations confirmed high semantic and conceptual equivalence. The multidisciplinary expert committee confirmed all four equivalences, implementing specific reformulations for cultural relevance. For instance, FEEDME-Culture item 2 was reformulated to "Antes de receber o feedback, foi solicitada uma avaliação do meu próprio desempenho", item 6 to "Quando recebi feedback sobre como melhorar, senti que as expectativas eram razoáveis e possíveis de serem alcançadas", item 15 to "Houve um acompanhamento posterior para avaliar meu progresso em relação ao feedback recebido", and an explanation was added to item 14: "Recebi feedback reforçador (destacando o que devo continuar fazendo) e corretivo (indicando o que preciso melhorar)". FEEDME-Provider item 3 was reformulated to "A pessoa que me deu feedback teve oportunidades adequadas de observar meu desempenho antes de avaliá-lo", item 9 was changed to "Acredito que a pessoa que me dava feedback tinha meu desenvolvimento profissional em consideração", and item 11 was changed to "A discussão do feedback era uma conversa de mão dupla". A pre-test with 15 surgical residents using cognitive debriefing confirmed item comprehension and

cultural appropriateness, leading to final refinements. Formal approval by the Coordinating Committee on December 2, 2024, concluded this stage, with instruments available on OSF and in Additional file 1.

3.3 Psychometric properties evaluation

Psychometric analyses were conducted using R. An unconventional CFA approach was used, based on Goodman-Kruskal's Gamma correlation matrix and ULSMV estimation, robust for small samples.

3.3.1 Reliability of instruments:

Composite reliability (pc) indicated excellent internal consistency. For FEEDME-Culture, Feedback Characteristics showed $pc = .937$, and Feedback Delivery $pc = .939$. For FEEDME-Provider, Feedback Provider Characteristics was $pc = .914$, Feedback Exchange $pc = .866$, and Feedback Quality $pc = .876$. All values were well above the $\geq .60$ cutoff.

3.3.2 Construct validity:

CFA was performed. For FEEDME-Culture ($n = 64$), a unidimensional model was compared to a two-factor correlated model (Feedback Characteristics and Feedback Delivery). Both models showed satisfactory global fit indices, though robust RMSEA was $.100$ for both (slightly exceeding the $.08$ cutoff), and standardized root mean square residual (SRMR) was $.088$ (unidimensional) and $.087$ (two-factor). The two-factor model was statistically superior ($\Delta\chi^2 = 336.6$, $\Delta df = 1$, $p < 2.2e-16$). Factor loadings (λ) for the two-factor model are presented in Table 3. Loadings ranged from $.58$ (Q9) to $.88$ (Q8) for Feedback Characteristics, and from $.77$ (Q15) to $.92$ (Q11) for Feedback Delivery. The correlation between these two factors was very high ($.953$), indicating substantial conceptual overlap. The structural model for FEEDME-Culture is visually represented in Fig. 2.

Table 3
Items factor loadings (λ) for the two-factor FEEDME-Culture instrument model

Items	Feedback Characteristics (λ)	Feedback Delivery (λ)
Q1	0.73	0.00
Q2	0.72	0.00
Q3	0.84	0.00
Q4	0.81	0.00
Q5	0.76	0.00
Q6	0.75	0.00
Q7	0.86	0.00
Q8	0.88	0.00
Q9	0.58	0.00
Q10	0.84	0.00
Q11	0.00	0.92
Q12	0.00	0.89
Q13	0.00	0.91
Q14	0.00	0.81
Q15	0.00	0.77
Q16	0.00	0.81

For FEEDME-Provider ($n = 71$), a unifactorial model was compared to a three-factor correlated model (Feedback Provider Characteristics, Feedback Exchange, and Feedback Quality). The unifactorial model showed good fit (robust CFI = .981, robust RMSEA = .088 (slightly exceeded cutoff), SRMR = .076). The three-factor model demonstrated satisfactory fit with all indices within recommended criteria (robust CFI = .987, robust RMSEA = .076, SRMR = .064). The three-factor model was statistically superior ($\Delta\chi^2 = 928.44$, $\Delta df = 3$, $p < 2.2e-16$). Factor loadings (λ) for the three-factor model are presented in Table 4. Loadings ranged from .751 to .889 for Feedback Provider Characteristics, .741 to .839 for Feedback Exchange, and .688 to .998 for Feedback Quality. Standardized factor correlations were high: Feedback Provider Characteristics with Feedback Exchange ($r = .929$), with Feedback Quality ($r = .815$), and Feedback Exchange with Feedback Quality ($r = .884$), suggesting strong conceptual overlap. The structural model for FEEDME-Provider is visually represented in Fig. 3.

Table 4
Items factor loadings (λ) for the three-factor FEEDME-Provider instrument model

Items	Feedback Provider Characteristics (λ)	Feedback Exchange (λ)	Feedback Quality (λ)
Q1	0.782	0.000	0.000
Q2	0.867	0.000	0.000
Q3	0.751	0.000	0.000
Q4	0.821	0.000	0.000
Q5	0.889	0.000	0.000
Q6	0.000	0.794	0.000
Q7	0.000	0.741	0.000
Q8	0.000	0.764	0.000
Q9	0.000	0.839	0.000
Q10	0.000	0.000	0.711
Q11	0.000	0.000	0.688
Q12	0.000	0.000	0.703
Q13	0.000	0.000	0.825
Q14	0.000	0.000	0.998

3.3.3 Item-level analysis:

The distribution of responses for FEEDME-Culture items showed considerable variation, with some items concentrated at extreme categories (e.g., Q2: 56.25% option 1; Q4: 48.44% option 5), while others were more balanced. Corrected Goodman-Kruskal Gamma correlations between items were all positive, ranging from .21 (Q9×Q15) to .88 (Q12×Q13). For FEEDME-Provider items, responses were highly concentrated in the highest category for several items (e.g., Q4: 78.87%, Q5: 60.56%), with low percentages in lower categories, except for specific items like Q10 (1 = 18.31%) and Q12 (1 = 19.72%). Gamma correlations were all positive, ranging from .44 (Q3×Q10) to .91 (Q4×Q5).

3.3.4 Normative data:

Similar to the original study, both adapted instruments showed a tendency for participants to endorse higher response categories, particularly for FEEDME-Provider factors and FEEDME-Culture's Feedback Characteristics, suggesting preserved general distributional characteristics.

4. Discussion

This study rigorously translated, cross-culturally adapted, and initially validated the FEEDME-Culture and FEEDME-Provider instruments for Brazilian Portuguese. Guided by Beaton et al. (2000) and Alavi et al. (2026) guidelines, the process ensured robustness at each stage. Both adapted instruments demonstrated satisfactory initial psychometric properties. Challenges related to semantic divergences and idiomatic nuances were overcome through translator consensus, expert committee review, and pre-test adjustments, including specific item reformulations (e.g., FEEDME-Culture Q15, Q14 explanation; FEEDME-Provider Q11 for "two-way conversation"). The psychometric evaluation confirmed excellent composite reliability (pc values 0.866–0.939) and construct validity via CFA, which revealed two-factor correlated structure for FEEDME-Culture and three-factor correlated structure for FEEDME-Provider, both statistically superior to unidimensional models. Global fit indices were largely satisfactory, although robust RMSEA for FEEDME-Culture and FEEDME-Provider's unifactorial model slightly exceeded the recommended cutoff of 0.08.

4.1 Comparison with literature

The factorial structure of both instruments was largely maintained in the Brazilian version, consistent with Bing-You et al.'s (2018) original study, thus suggesting preservation of the original constructs. Composite reliability values (0.866–0.939) were comparable to or slightly higher than Cronbach's alpha reported in the original study (0.80–0.92). Item factor loadings were also comparable. However, the correlation between FEEDME-Culture factors (0.953) was higher than the original ($r = 0.7$), indicating a stronger conceptual overlap in the Brazilian context. These subtle differences may stem from cultural and contextual variations between populations and minor methodological distinctions [11], yet the maintained factorial structure reinforces transcultural validity.

4.2 Implications of equivalences

The rigorous pursuit of semantic, idiomatic, experiential, and conceptual equivalence was foundational for the content validity of the adapted FEEDME instruments. Every adjustment, from resolving semantic discrepancies to expert committee item reformulations (e.g., clarity for "follow-up" in FEEDME-Culture Q15) and pre-test refinements, ensured the adapted versions conveyed the same meaning and relevance as the originals. An inadequate adaptation process would compromise data validity and severely limit comparability across cultures [1, 2], emphasizing the importance of this meticulous approach for future cross-cultural research.

4.3 Considerations on psychometric properties

The psychometric properties of the adapted FEEDME instruments generally aligned with the original. High composite reliability (pc 0.866–0.939) confirmed adequate internal consistency, comparable to the original's Cronbach's alpha. Item response patterns, including negative asymmetry, were also preserved. The slightly elevated robust RMSEA for FEEDME-Culture and FEEDME-Provider's unifactorial model might indicate subtle cultural influences on item interpretation or covariance. The very high correlation (0.953) between FEEDME-Culture's factors suggests that "feedback characteristics" and "feedback

delivery" are perceived as highly intertwined in the Brazilian context, potentially more so than in the original study ($r = 0.7$). The use of ULSMV estimation was crucial given the small sample sizes ($n = 64$ and $n = 71$).

4.4 Study limitations

This study has several limitations. The relatively small sample sizes ($n = 64$ for FEEDME-Culture and $n = 71$ for FEEDME-Provider) may limit the robustness of CFA and generalizability, despite using ULSMV. The specific demographic characteristics of the sample (predominantly male, over 31, and pre-tested with surgical residents) also restrict generalizability to other Brazilian sub-populations. The cross-sectional design precludes evaluation of important psychometric properties like test-retest reliability and responsiveness to change. Furthermore, the validation focused on internal consistency and initial construct validity, without including criterion validity. Finally, the high correlation between FEEDME-Culture factors suggests a strong conceptual overlap that warrants further investigation in larger samples to confirm its distinct dimensionality.

4.5 Implications and contributions

This study significantly contributes to Social Sciences and Education research in Brazil by providing validated and culturally appropriate psychometric tools to assess feedback perception. These instruments fill a crucial gap, enabling educators and researchers to more accurately evaluate feedback culture and quality, thereby supporting the development of effective educational interventions and faculty development, as highlighted in the original study [5]. The replication of the original factorial structure underscores the universality of underlying feedback constructs while affirming the necessity of cultural adaptation. This work also provides a model for rigorous cross-cultural adaptation processes in the Brazilian context.

4.6 Suggestions for future research

Future research should explore: (1) deeper psychometric properties, including test-retest reliability and responsiveness, using larger and more diverse samples; (2) validation across different Brazilian sub-populations and contexts (e.g., various academic programs, health areas, geographical regions); (3) longitudinal studies to assess temporal stability and predictive validity related to academic or professional outcomes; (4) further investigation of the high factor correlation in FEEDME-Culture with larger samples to clarify its dimensionality; (5) application of the instruments in practical interventions to evaluate their effectiveness; (6) DIF analyses to assess potential biases across demographic groups; and (7) the development of normative data for the Brazilian population.

5. Conclusion

This study successfully translated, cross-culturally adapted, and initially validated the FEEDME-Culture and FEEDME-Provider instruments for Brazilian Portuguese. The process adhered strictly to methodological guidelines by Beaton et al. (2000) and Alavi et al. (2026), ensuring robustness from

independent translations and back-translations to multidisciplinary expert committee approval and pre-testing. The adapted instruments demonstrated suitable initial psychometric properties. Composite reliability (pc) showed excellent and robust values for all factors: 0.937 for "Feedback Characteristics" and 0.939 for "Feedback Delivery" in FEEDME-Culture; and 0.914 for "Feedback Provider Characteristics," 0.866 for "Feedback Exchange," and 0.876 for "Feedback Quality" in FEEDME-Provider. Confirmatory Factor Analysis (CFA) corroborated construct validity, revealing a two-factor correlated structure for FEEDME-Culture and a three-factor correlated structure for FEEDME-Provider, with satisfactory fit indices, confirming their statistical superiority over unidimensional models.

The adaptation and validation of the FEEDME instruments represent a significant contribution to research and practice in Social Sciences and Education in Brazil. These tools address a critical gap by providing validated and culturally appropriate psychometric measures for assessing trainees' feedback perception in Brazilian educational settings. Their application will enable educators and researchers to more precisely and systematically evaluate feedback culture and quality, thereby informing the development of more effective and targeted educational interventions. This rigorous cross-cultural adaptation and validation process holds intrinsic scientific value, ensuring data comparability and measurement accuracy across cultural contexts, thus avoiding erroneous conclusions. The maintenance of the original factorial structure, despite cultural nuances, reinforces the universality of feedback constructs while highlighting the essential role of cultural adaptation for instrument validity.

Abbreviations

T1 Translator 1

T2 Translator 2

BT1 Back-translator 1

BT2 Back-translator 2

DIF Differential item functioning

OSF Open Science Framework

CFA Confirmatory factor analysis

pc Composite reliability

ULSMV Unweighted least squares adjusted mean-variance

CFI Comparative fit index

RMSEA Root mean square error of approximation

Declarations

7.1 Ethics approval statement

Approval was obtained from the ethics committee of Faculty of Medicine of *São José do Rio Preto*. The procedures used in this study adhere to the tenets of the Declaration of Helsinki.

7.2 Consent to participate statement

Informed consent was obtained from all individual participants included in the study.

7.3 Data availability statement

All data generated or analyzed during this study are included in this published article (and its supplementary information files).

7.4 Competing interests statement

The authors have no competing interests to declare that are relevant to the content of this article.

7.5 Funding statement

This study has received funding from the country-tiered APC pricing pilot and from *Centro de Apoio à Pesquisa e Publicação (CENAP- Hospital de Base/Funfarme/FAMERP)*.

7.6 Authors contributions statement

CC is the main researcher and was responsible for the study conceptualization and performance of data curation, investigation, formal analyses, writing the original draft, writing review, editing, and project administration. SC, GS, ES, JM, MS, LSAS, AE, PC, TC, SG, RF, LA, ET, MV, LCFS, IR, DO, and AO contributed to writing, review, and editing. JA contributed to conceptualization and formal analyses, writing, review, editing, and supervision. All authors contributed to the manuscript reading and the approval of the submitted version.

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Figures

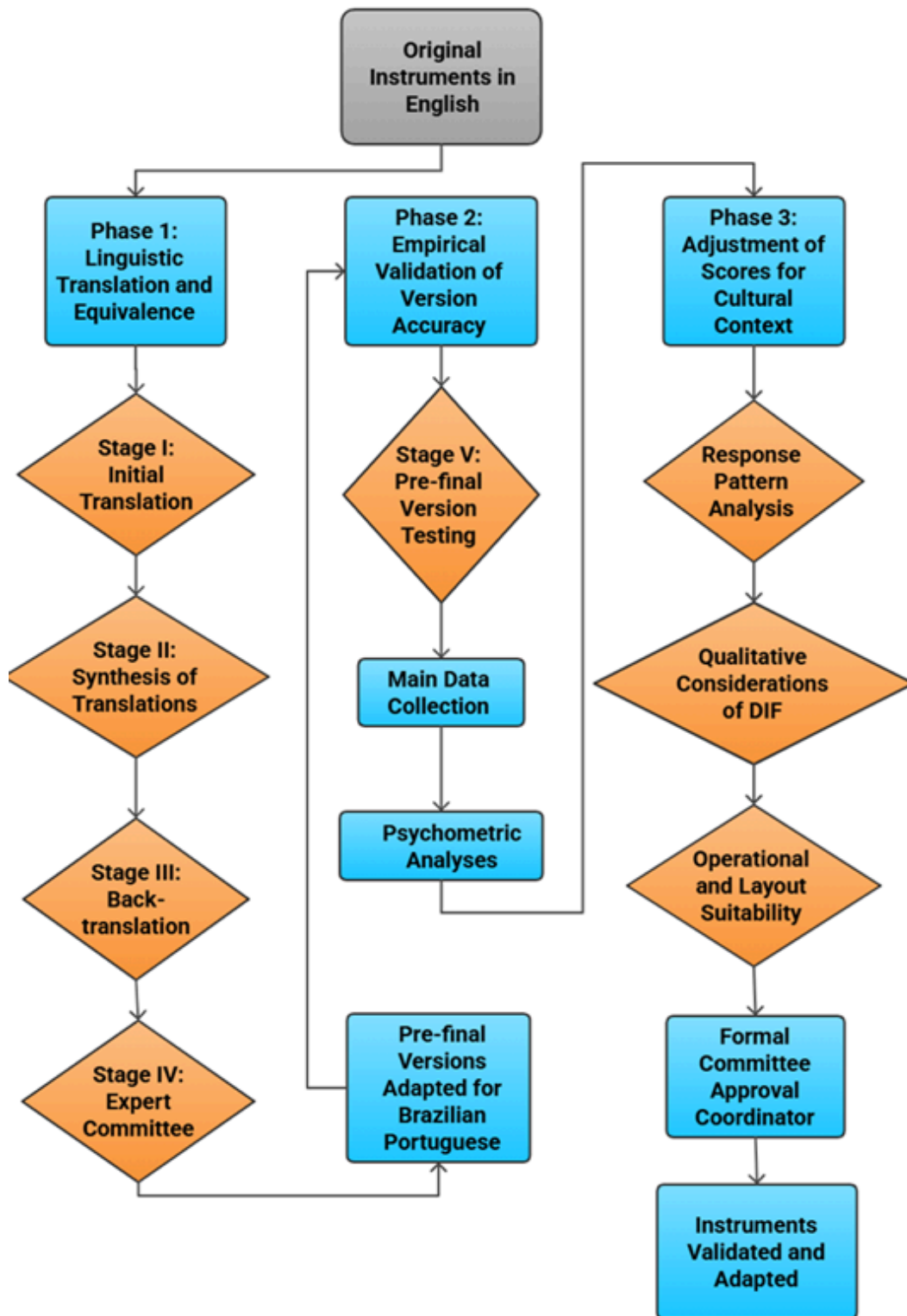


Figure 1

Flowchart of the cross-cultural adaptation and validation process of the FEEDME-Culture and FEEDME-Provider instruments for Brazilian Portuguese

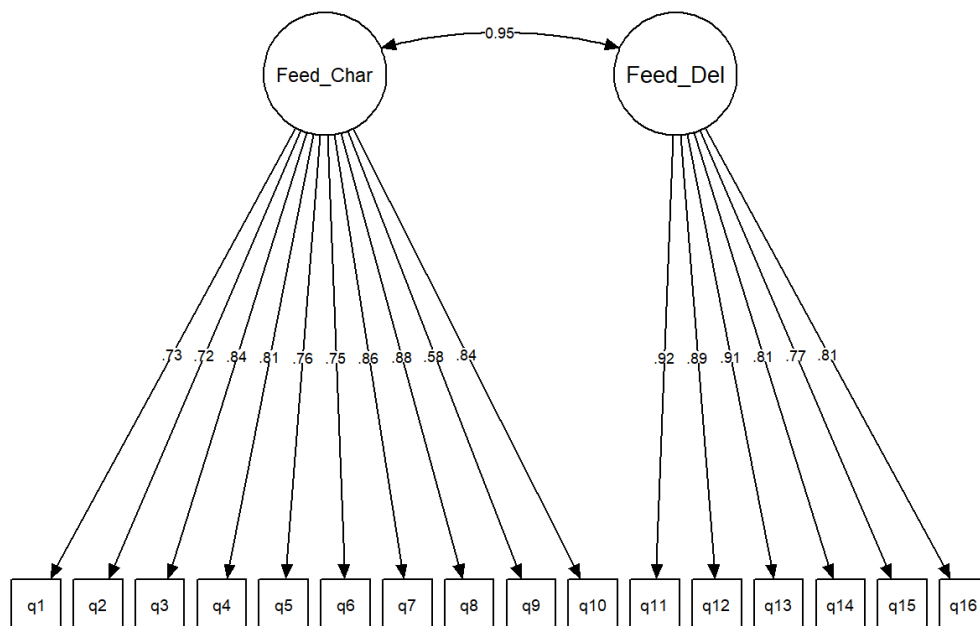


Figure 2

Structural model of the FEEDME-Culture instrument with two correlated factors

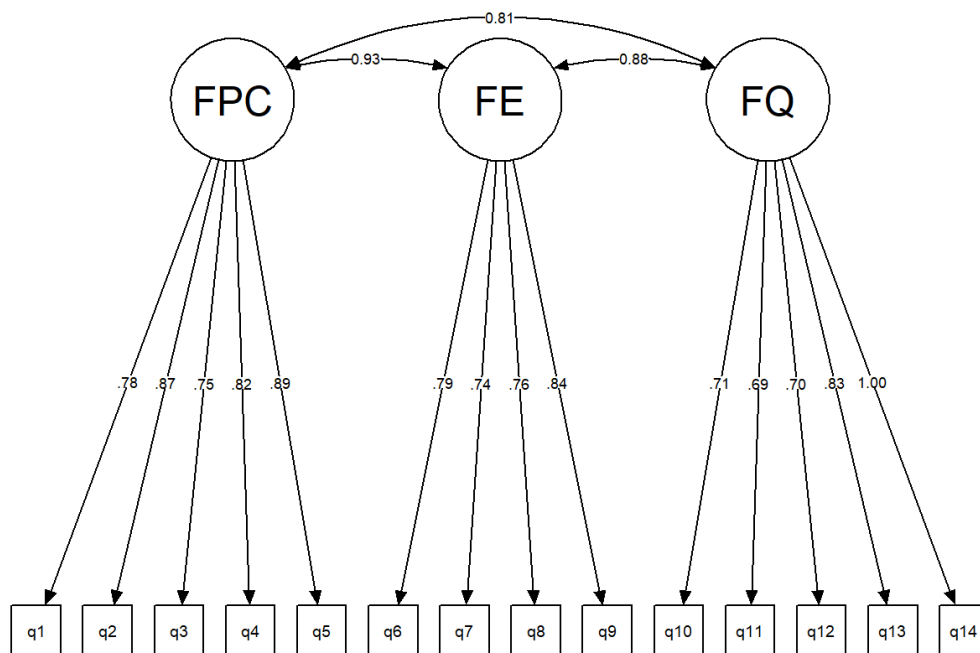


Figure 3

Structural model of the FEEDME-Provider instrument with three correlated factors