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Beaton's guidelines in cross-cultural adaptation studies in Brazil: a systematic review

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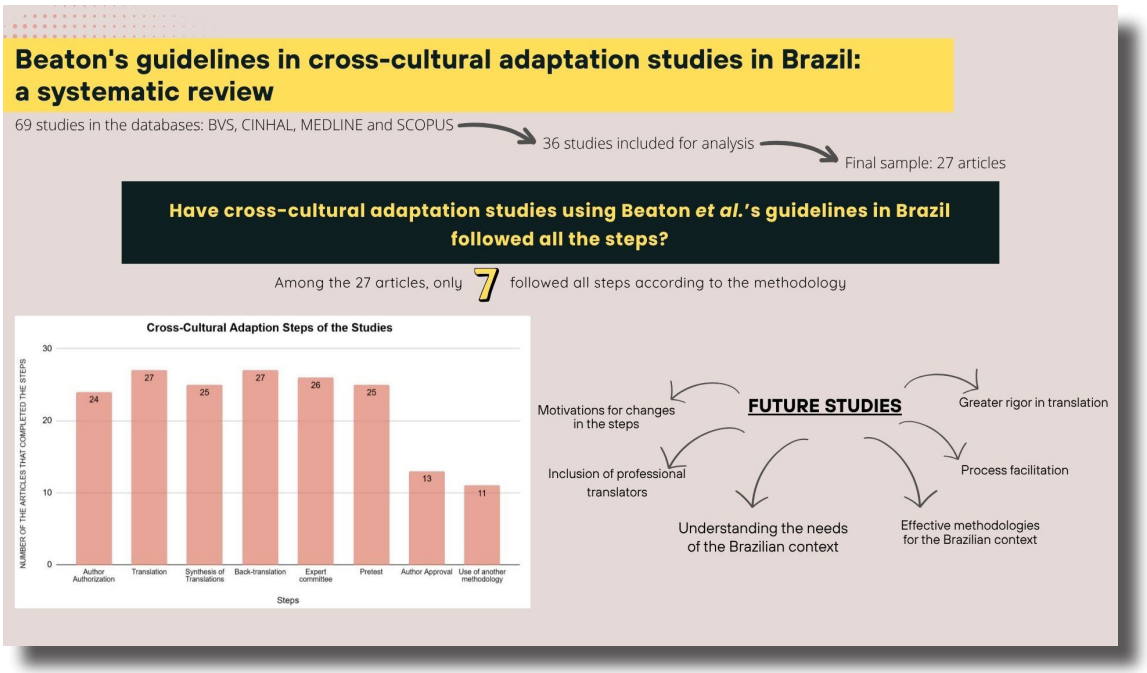
Graphical Abstract



Highlights

- *Out of 27 studies, only 7 followed the guidelines proposed by Beaton et al.*
- *Most studies modified the steps of Beaton et al.'s methodology.*
- *Understanding the Brazilian context and its specific needs is essential for developing new forms of cross-cultural adaptation.*

Abstract

This study aimed to evaluate the application of the guidelines proposed by Beaton *et al.* in Brazil for the cross-cultural adaptation of health instruments into Brazilian Portuguese. A systematic review was conducted of articles published between 2015 and 2022 in the BVS, CINAHL, MEDLINE, and SCOPUS databases. Open-access articles that detailed the cross-cultural adaptation process based on the steps proposed by Beaton *et al.* were included. Review articles, studies published before 2015, or those that did not detail the adaptation steps were excluded. Analysis of the 27 selected articles revealed that only 7 fully followed Beaton *et al.*'s guidelines. Changes to the steps were common: pre-testing (11 studies), synthesis (7), translation (6), expert committee (5), and back-translation (2). Furthermore, 11 articles combined other methodologies, 10 added steps, 5 excluded steps, and 6 altered the proposed order. It was concluded that the work of Beaton *et al.* remains a key reference in the literature, and the proposed steps have proven feasible and applicable in Brazilian cross-cultural adaptation studies. However, frequent modifications suggest the need to further study the Brazilian context to understand the possibilities for developing country-specific practical guidelines.

Keywords: Translation. Cross-Cultural Adaptation. Questionnaires. Assessment Instruments.

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INTRODUCTION

In contexts where no appropriate instruments exist to measure a given variable in the native language, clinicians and researchers may choose to either develop a new instrument or modify one that has already been validated in another language through the process of cross-cultural adaptation[1].

If a new measure is constructed, a significant amount of time is devoted to establishing the conceptual framework of the instrument and to developing the items[1]. On the other hand, when opting to use an existing instrument, the translation must follow rigorous criteria within the cross-cultural adaptation process to address both linguistic and cultural differences, as well as to ensure its applicability in the new context[2].

Thus, the need for cross-cultural adaptation arises when aiming to apply an assessment instrument in a country different from the one in which it was originally developed or officially validated, particularly when there are differences in language and culture[3]. The translation and cross-cultural adaptation of international instruments are as important as the development of a new assessment measure[4], as the goal is to maintain equivalence with the original protocol in terms of language, usage, and applicability[5].

By seeking equivalence with the original protocol, cross-cultural adaptation can be an important tool in multicenter studies, as it enables the use of unified assessments and the reliable comparison of results across different locations, groups, and cultures, thus supporting joint decision-making. Employing this process can also help reduce the development of instruments with questionable technical quality by allowing data comparability and collaborative decision-making[6].

These procedures may also serve as alternatives in countries lacking a broad set of assessment instruments for human development aspects[4]. It is advisable to use instruments with consistent psychometric properties in cross-cultural studies to ensure valid translations that are culturally acceptable[7].

In Brazil, cross-cultural adaptation processes have been frequently conducted; however, in general, there is no consensus regarding the methodology to be followed, which reveals the use of various methodological approaches[6].

There are different recommendations aiming to standardize the procedures for translating and adapting instruments for use in other countries, such as the guidelines from the American Association of Orthopaedic Surgeons (AAOS)/Institute of Work and Health (IWH)[8], the International Test Commission Guideline for Test Adaptation[9], and the Medical Outcomes Trust[10].

For this study, the standardized guidelines by Dorcas Beaton *et al.* in her three publications[1,3,8] were considered. Beaton and her team conducted research on the processes of translating and adapting measurement instruments in the fields of psychology, medicine, sociology, and quality of life. Based on this, she began to formulate and disseminate guidelines for the procedure, with three main publication dates: 1993, 2000, and 2002[1,3,11].

This team of researchers has been a national and international reference in scientific studies on cross-cultural adaptation[11]. For this reason, the present study aimed to identify and systematize research that conducted the cross-cultural adaptation of health-related instruments into Brazilian Portuguese, based on the guidelines proposed by Beaton *et al.*[3], in order to assess how these guidelines have been applied in practice in Brazil and to understand their feasibility and use within the Brazilian context.

The motivations for conducting this study stem from the importance of countries having available versions of instruments for clinical application or for the development of new research within their own culture. For this to be possible, it is essential to have specific methods for producing new versions.

Beaton *et al.*'s[3] standardized guidelines for translation and cultural adaptation consider semantic equivalence of terms used, as well as idiomatic, experiential, and conceptual equivalence throughout the translation process, employing techniques such as back-translation, revision, pre-testing, and score review.

Semantic equivalence aims for correspondence in the meaning of words used in both instruments, with adjustments in vocabulary and grammar when necessary for example, the use or omission of gerunds. Idiomatic equivalence refers to the alignment between languages, with special attention to colloquial expressions that may have multiple translation options and can be rendered using approx-

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imate expressions. Experiential equivalence deals with everyday experiences that, although translatable, may not be appropriate in another culture, requiring the substitution of the original item with something culturally relevant in the target context. Conceptual equivalence refers to identical words that may carry different meanings across cultures, thus requiring appropriate adjustments[3].

The translation and cross-cultural adaptation steps recommended by Beaton *et al.*[3] are described below:

Step I – Translation

The translation is carried out from the original language into the target language by two bilingual translators whose native language must be Brazilian Portuguese and who should come from different professional backgrounds, allowing for comparison of language choices and correction of discrepancies (Beaton *et al.*, 2000)[3]. Each translator independently provides comments on challenging phrases or uncertainties in the items. The first translator should be aware of the concepts assessed by the instrument, ensuring closer equivalence in the necessary adaptations[3], thus producing a preliminary translation. The second translator should come from a different field and should not have prior knowledge of the instrument's measured concepts, so as to be more likely to identify ambiguous meanings[5]. The result of this stage is a report (T1 and T2) from each translator, containing the translation and their comments on any uncertainties[3].

Step II – Synthesis of the Translations

A consensus translation is produced based on the two versions, resolving any discrepancies[3]. This translation is developed through a meeting involving both translators and an observer-reporter, who acts as a judge. The outcome of this stage is a single translation report (T-1.2), accompanied by a detailed description of the synthesis process, including the ambiguous terms and the rationale for the final decisions[3].

Step III – Back translation

Back translations are translations of the synthesized version into the original language of the instrument. They must be carried out by two individuals whose native language is that of the original instrument and who have no prior knowledge of it. Since the translators are unfamiliar with the original instrument, it is expected that they will identify discrepancies and suggest reformulations of questions where asymmetries are found[3,5].

Step IV – Expert committee review

The objective of the committee is to consolidate all versions of the questionnaire into a pre-final version for testing, including the justifications for the translation decisions made, aiming to achieve equivalence between the original and translated versions in the following aspects: (a) semantic equivalence; (b) idiomatic equivalence; (c) experiential equivalence; and (d) conceptual equivalence. Regarding semantics, a word may have more than one meaning in different cultures; similarly, in idiomatic terms, colloquial expressions may have several translation possibilities. Concerning everyday experiences, an item may be translatable but not culturally relevant in another country for instance, the use of utensils during meals, as some countries use forks and knives for their main meals, while others use chopsticks. Likewise, similar words may have different conceptual meanings, potentially leading to different interpretations by the instrument's respondent[3].

This expert committee should include: a researcher experienced in validation studies, a health professional knowledgeable about the subject addressed by the instrument, a language professor, the two translators, the two back-translators, and the judge or observer-reporter[3].

Step V – Pretesting

In this final stage of adaptation, the nearly finalized version must be applied to 30 to 40 research participants, who respond to the instrument and are then interviewed about their interpretation of each item and their responses, aiming to preserve equivalence in a real-world application context[3]. If necessary, the translated version should be revised and a new pretest conducted. Once the translated version is deemed satisfactory, the pretest stage is concluded[11].

Step VI – The final stage

With the fifth step completed, the final report must be prepared, containing the final version of the translated instrument from the cross-cultural adaptation process. This report should be submitted to the original instrument's authors and developers, along with all prior reports and versions from the preceding steps, for their review and approval of the entire process[3].

METHODOLOGICAL PROCEDURES

This study was conducted through a systematic review, which involves the identification and analysis of multiple studies on a specific topic, following well-defined steps[12], and provides a thorough summary of the current literature relevant to the formulated research question[13]. Systematic methods aim to minimize bias and ensure that the results and conclusions are as objective and impartial as possible[14].

The following steps were followed in conducting the review: formulation of the research question; definition of descriptors and search strategies in the databases by at least two independent researchers; establishment of inclusion and exclusion criteria for article selection; comparison of search results by the two researchers; justification for the exclusion of studies; analysis of all studies included in the review; development of a critical synthesis of the information provided by the included studies; and presentation of conclusions regarding the findings[15].

For structuring the review, the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines were adopted. PRISMA consists of a 27-item checklist[16] covering aspects from the title to the discussion and other supplemental sections[17], aiming to support and enhance the reporting of systematic reviews and meta-analyses[16].

During the initial consultations for defining this study, an article was identified that developed a similar proposal, analyzing the applicability of the recommended steps across different methodologies adopted in cross-cultural adaptation processes, using the databases BVS (Virtual Health Library) and BIREME (Latin American and Caribbean Center on Health Sciences Information), between February and May of 2014[6].

Recognizing the relevance of the information gathered in the aforementioned study, the present research sought articles dated from 2015 onward, up to 2022.

The guiding research question was: Have the studies that employed the guidelines proposed by Beaton *et al.*[3] for the cross-cultural adaptation of health assessment instruments for use in Brazil followed all the steps in their entirety up to the pretesting phase?

For data collection, thesaurus searches were conducted through DeCS using keywords related to the topic, resulting in the following descriptors: ("Cross cultural comparison") AND ("Brazilian Portuguese" OR "Brazil") AND ("Translating") AND ("Beaton").

In August 2022, articles containing these descriptors were selected from the BVS, CINAHL, MEDLINE, and SCOPUS databases. Inclusion criteria for the selected articles were: open-access availability; instruments cross-culturally adapted for use in Brazil; and a detailed description of the adopted adaptation process, including the methodological steps as proposed by Dorcas Beaton[3] Exclusion criteria were: articles published before 2015; review articles; articles that did not describe the steps of the cross-cultural adaptation process; or instruments adapted for use in other countries. The search, selection, and analysis of the articles were conducted by two independent reviewers. Based on the results, it was decided to analyze studies that cited Beaton *et al.*[3], and Guillemin, Bombardier and Beaton[1], as both refer to methodologies proposed by the same research group.

A total of 69 articles were identified: 1 in the BVS database, 1 in CINAHL with Full Text, 3 in MEDLINE, and 64 in SCOPUS. Regarding publication year, articles were found from 2010 (n = 1), followed by 2017 (n = 1), 2018 (n = 11), 2019 (n = 15), 2020 (n = 19), 2021 (n = 18), and 2022 (n = 4).

Articles published before 2015 (n = 1), studies involving cross-cultural adaptations for countries other than Brazil (n = 26), duplicate articles (n = 2), articles with restricted access or abstract only (n = 0), and review articles (n = 4) were excluded, resulting in 36 articles for analysis.

Of these 36 articles, 9 were excluded for employing other cross-cultural adaptation methods or for not clearly stating the method used. These included: one article that applied the ISPOR methodology (2005)[18] one that followed Reichenheim and Moraes (2007)[19]; one that used Ferrer *et al.* (1996)[20]; one that followed Diao *et al.* (2014)[21], and one that did not report the method used[22]. Additionally, four other articles, although not explicitly adopting the methodology under study, cited Beaton *et al.* at some point: one article that used the PROMIS® guidelines (2013)[23] and referred to Beaton's team to explain the concept and importance of cross-cultural adaptation and equivalence analysis; one that cited Reichenheim and Moraes (2007), Gjersing *et al.* (2010), and the International Test Commission (2016)[24], also referencing Beaton to highlight the relevance of cross-cultural adaptation; one that adopted Herdman *et al.* (1998)[25] and cited Beaton's team in the semantic equivalence

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stage; and one article that did not specify the method followed but cited Beaton's team to emphasize the importance of cross-cultural adaptation of instruments[26]. A future study analyzing these excluded articles could provide insight into the reasons for not employing the steps proposed by Beaton's team.

This process is illustrated in Figure 01 below:

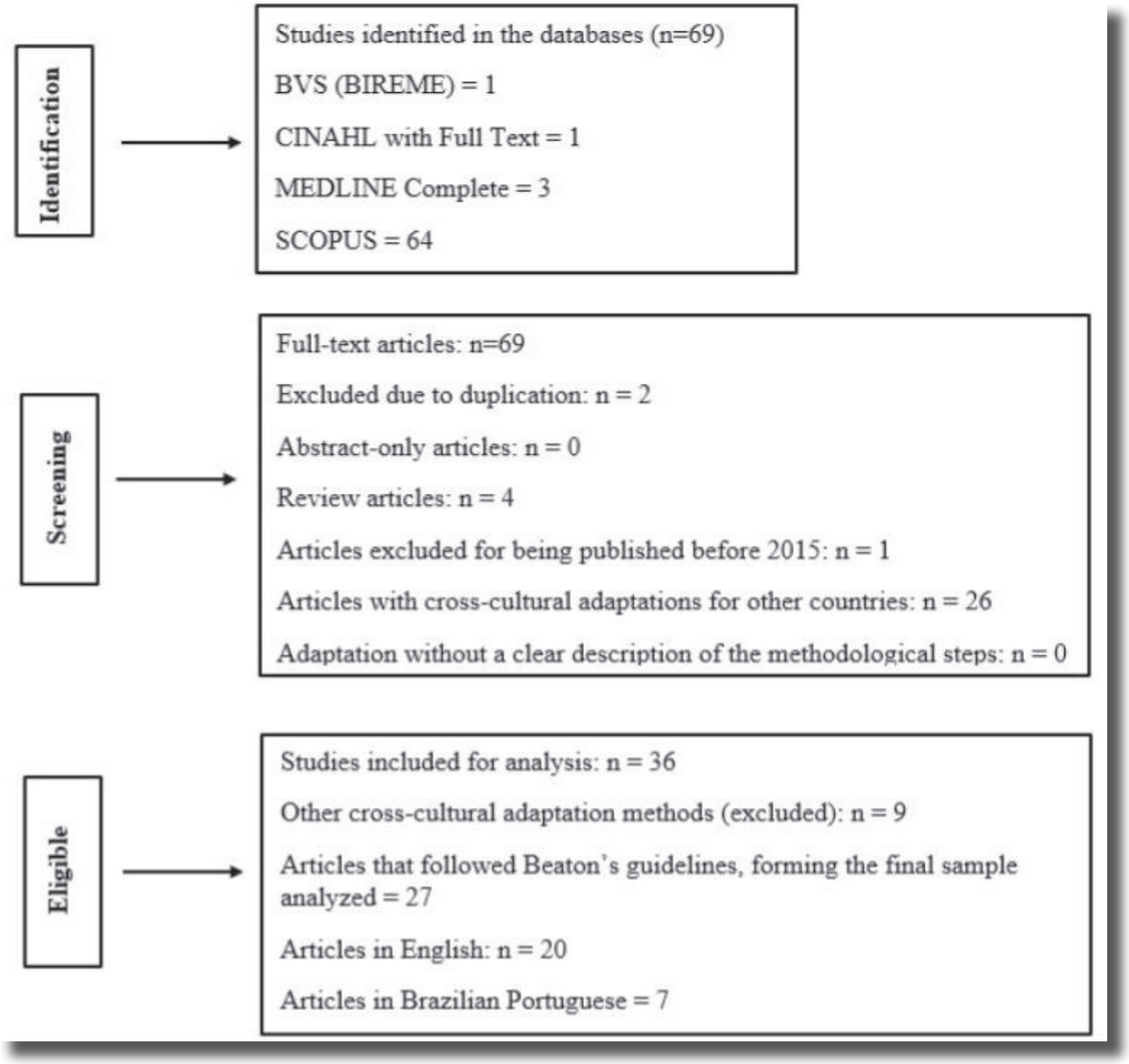

Figure 1 - Selection of Articles in the Databases.

It is important to note that, for refinement of the selection process, all 69 articles were manually analyzed with regard to their methodology, resulting in 27 articles included in the present review. A database was created to systematize the information from the studies, consisting of the reference, year, language, database, and a detailed description of all the cross-cultural adaptation steps carried out in each study, along with the corresponding guidelines.

RESULTS

Table 01 below presents the publications that comprised the final sample of 27 articles, which employed the guidelines of Beaton *et al.*[1,3] for the cross-cultural adaptation of instruments for use in Brazil:

Table 1 - Characterization of the Articles Included in the Review.
(Articles published between 2015 and 2022 in the BVS, CINAHL, MEDLINE, and SCOPUS databases).

Author	Article	Journal	Study objective
Fernandes *et al.*[27]	Translation of social and occupational functioning scale for epilepsy into Portuguese - Brazil.	Arquivos de Neuro-Psiquiatria	Cross-cultural adaptation of the PAIR instrument into Brazilian Portuguese.
Gayoso *et al.*[28]	Cross-cultural adaptation and validation for the Brazilian population of the instrument Amyotrophic Lateral Sclerosis-Specific Quality of Life-Short Form (ALSSQOL-SF).	Quality of Life Research	Translation and cultural adaptation of the Hip Sports Activity Scale (HSAS) into Brazilian Portuguese.
Augusto *et al.*[29]	Development of the Portuguese Version of the Modified Japanese Orthopaedic Association Score: Cross-Cultural Adaptation, Reliability, Validity, and Responsiveness.	World Neurosurgery	Cross-cultural adaptation and measurement property evaluation of the VISA-A questionnaire in Brazilian Portuguese.
Borges *et al.*[30]	Reduced version of the Activity Measure for Post-Acute Care (AM-PAC) for inpatients, "6-clicks": Brazilian-Portuguese cross-cultural adaptation and measurement properties.	Brazilian Journal of Physical Therapy	Cross-cultural adaptation and validation of the ICIQ-OABqol into Brazilian Portuguese.
Calado *et al.*[31]	Cross-cultural adaptation of Rotter's General Locus of Control instrument.	Trends in Psychiatry and Psychotherapy	Translation, cultural adaptation, and psychometric evaluation of the Brazilian version of the CFKS.
Carneiro *et al.*[32]	O empoderamento na reabilitação auditiva: tradução dos questionários de autoadvocacia.	CoDAS	Cross-cultural adaptation of the Rivermead Post-Concussion Symptoms Questionnaire into Brazilian Portuguese.
Melo Filho *et al.*[33]	The HOME FAST BRAZIL self-report version: translation and transcultural adaptation into Brazilian Portuguese.	Advances in Rheumatology	Translation of the Headache Disability Inventory into Brazilian Portuguese and analysis of its measurement properties.
Garcia *et al.*[34]	Translation and validation of Pediatric Quality of Life InventoryTM 3.0 Diabetes Module (PedsQLTM 3.0 Diabetes Module) in Brazil-Portuguese language.	Jornal de Pediatria (Rio de Janeiro)	Translation and cross-cultural adaptation of the Pediatric Asthma Control and Communication Instrument (PACCI) for Brazilian Portuguese, with content validity and semantic equivalence.
Gonçalves *et al.*[35]	Cross-Cultural Adaptation of Instruments Measuring Children's Movement Behaviors and Parenting Practices in Brazilian Families.	International Journal of Environmental Research and Public Health	Cross-cultural adaptation of the SSQ-HF into Brazilian Portuguese and content validation of the adapted version.
Gvozd *et al.*[36]	Cultural adaptation of the Retirement Resources Inventory for Brazilian culture.	Revista de Saúde Pública	Cross-cultural validation of the Responsive Interactions for Learning (RIFL-P) tool for Brazil.
Jomori *et al.*[37]	How was the cooking skills and healthy eating evaluation questionnaire culturally adapted to Brazil?	Ciência & Saúde Coletiva	Cultural adaptation of the Glamorgan Scale into Brazilian Portuguese.
Kamonseki *et al.*[38]	The Brazilian version of the Bournemouth questionnaire for low back pain: translation and cultural adaptation.	São Paulo Medical Journal	Cross-cultural adaptation of the PAIR instrument into Brazilian Portuguese.
Krug *et al.*[39]	Back pain attitudes questionnaire: Cross-cultural adaptation to brazilian-portuguese and measurement properties.	Journal of Physical Therapy	Translation and cultural adaptation of the Hip Sports Activity Scale (HSAS) into Brazilian Portuguese.
Lapas *et al.*[40]	Tradução e adaptação cultural do questionário Sleep Apnea Clinical Score para uso no Brasil.	Jornal Brasileiro de Pneumologia	Cross-cultural adaptation and measurement property evaluation of the VISA-A questionnaire in Brazilian Portuguese.
Logullo *et al.*[41]	The Brazilian Portuguese Version of the DISCERN Instrument: Translation Procedures and Psychometric Properties.	Value in Heatlh Regional Issues	Cross-cultural adaptation and validation of the ICIQ-OABqol into Brazilian Portuguese.

to be continued...

...continuation - Table 1

Author	Article	Journal	Study objective
Maggi *et al.*[42]	Cross-cultural adaptation and validation of the International Cooperative Ataxia Rating Scale (ICARS) to Brazilian Portuguese.	Arquivos de Neuro-Psiquiatria	Translation, cultural adaptation, and psychometric evaluation of the Brazilian version of the CFKS.
Marquito *et al.*[43]	Adaptação transcultural do instrumento PAIR: Pharmacotherapy Assessment in Chronic Renal Disease para aplicação no Brasil.	Ciência & Saúde Coletiva	Cross-cultural adaptation of the Rivermead Post-Concussion Symptoms Questionnaire into Brazilian Portuguese.
Mathias *et al.*[44]	The Brazilian version of the Hip Sports Activity Scale: translation and cross-cultural adaptation.	São Paulo Medical Journal	Translation of the Headache Disability Inventory into Brazilian Portuguese and analysis of its measurement properties.
Mesquita *et al.*[45]	Cross-cultural Adaptation and Measurement Properties of the Brazilian Portuguese Version of the Victorian Institute of Sport Assessment-Achilles (VISA-A) Questionnaire.	Journal of Orthopaedic & Sports Physical Therapy	Translation and cross-cultural adaptation of the Pediatric Asthma Control and Communication Instrument (PACCI) for Brazilian Portuguese, with content validity and semantic equivalence.
Monteiro *et al.*[46]	The Brazilian Portuguese version of the ICIQ-OABqol: cross-cultural adaptation and reliability	International Urogynecology Journal	Cross-cultural adaptation of the SSQ-HF into Brazilian Portuguese and content validation of the adapted version.
Monteiro *et al.*[47]	Translation, cross-cultural adaptation and psychometric evaluation of the Brazilian version of the Cystic Fibrosis Knowledge Scale (CFKS).	PLoS ONE	Cross-cultural validation of the Responsive Interactions for Learning (RIFL-P) tool for Brazil.
Nagumo *et al.*[48]	Brazilian version of the Rivermead Post-Concussion Symptoms Questionnaire.	Arquivos de Neuro-Psiquiatria	Cultural adaptation of the Glamorgan Scale into Brazilian Portuguese.
Pradela *et al.*[49]	Brazilian Portuguese version of the Headache Disability Inventory: Cross-cultural adaptation, validity, and reliability.	Cephalalgia	Cross-cultural adaptation of the PAIR instrument into Brazilian Portuguese.
Santino *et al.*[50]	Pediatric Asthma Control and Communication Instrument: tradução e adaptação transcultural para a língua portuguesa falada no Brasil	Jornal Brasileiro de Pneumologia	Translation and cultural adaptation of the Hip Sports Activity Scale (HSAS) into Brazilian Portuguese.
dos-Santos *et al.*[51]	Symptom Status Questionnaire Heart Failure Brazilian Version: cross-cultural adaptation and content validation.	Heart & lung: the journal of critical care	Cross-cultural adaptation and measurement property evaluation of the VISA-A questionnaire in Brazilian Portuguese.
Schneider *et al.*[52]	Cross-Cultural Adaptation and Validation of the Brazilian Portuguese Version of an Observational Measure for Parent–Child Responsive Caregiving.	International Journal of Environmental Research and Public Health	Cross-cultural adaptation and validation of the ICIQ-OABqol into Brazilian Portuguese.
Vocci *et al.*[53]	Cultural adaptation of the Glamorgan Scale to Brazilian.	Revista Latino-Americana de Enfermagem	Translation, cultural adaptation, and psychometric evaluation of the Brazilian version of the CFKS.

The studies included in the final analysis followed the guidelines proposed by Beaton *et al.*[3] regarding the following steps: (1) translations, (2) synthesis of the translations, (3) back-translations, (4) review of previous steps by an expert committee, (5) pretesting of the final version with the instrument's target population seeking semantic, idiomatic, experiential, and conceptual equivalence of the terms used and (6) final stage, which involves the finalization of the translated version and submission of the reports to the original authors for review and approval. These procedures are detailed in Table 02, where "yes" indicates that the step was performed, "no" indicates that the step was not mentioned in the study, and asterisks indicate steps that were carried out with modifications compared to the methodology proposed by Beaton *et al.*[3].

Before the development of these steps, Beaton *et al.*[3] guidelines recommend obtaining authorization from the original instrument's author to secure permission and to verify whether other researchers have already undertaken or are in the process of undertaking such adaptation.

Table 2 - Cross-Cultural Adaptation Steps in the Studies.

Study	Prior Authorization from Authors	Tradução	Translation Synthesis	Back-Translation	Expert Committee	Pretesting	Author Approval	Use of Another Methodology
Fernandes *et al.*[27]	Yes	Yes	Yes	Yes	No	Yes	Yes	No
Gayoso *et al.*[28]	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Augusto *et al.*[29]	No	Yes*	Yes	Yes	Yes	Yes*	No	No
Borges *et al.*[30]	Yes	Yes*	Yes	Yes	Yes	Yes	No	Yes
Calado *et al.*[31]	No	Yes	No	Yes	Yes	Yes*	No	No
Carneiro *et al.*[32]	Yes	Yes*	No	Yes*	Yes	Yes*	Yes	No
Melo Filho *et al.*[33]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Garcia *et al.*[34]	Yes	Yes	Yes	Yes	Yes	Yes*	Yes	Yes
Gonçalves *et al.*[35]	No	Yes	Yes	Yes	Yes	Yes*	No	No
Gvozd *et al.*[36]	Yes	Yes	Yes	Yes	Yes	Yes*	Yes	Yes
Jomori *et al.*[37]	Yes	Yes	Yes	Yes	Yes	Yes*	No	Yes
Kamonseki *et al.*[38]	Yes	Yes	Yes*	Yes	Yes*	Yes	No	Yes
Krug *et al.*[39]	Yes	Yes*	Yes	Yes	Yes*	Yes	No	No
Lapas *et al.*[40]	Yes	Yes*	Yes*	Yes	Yes*	Yes*	No	No
Logullo *et al.*[41]	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Maggi *et al.*[42]	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Marquito *et al.*[43]	Yes	Yes	Yes	Yes*	Yes	Yes*	Yes	Yes
Mathias *et al.*[44]	Yes	Yes*	Yes*	Yes	Yes*	Yes	Yes	No
Mesquita *et al.*[45]	Yes	Yes	Yes	Yes	Yes	Yes*	No	No
Monteiro *et al.*[46]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Monteiro *et al.*[47]	Yes	Yes	Yes*	Yes	Yes	Yes*	Yes	Yes
Nagumo *et al.*[48]	Yes	Yes	Yes*	Yes	Yes	Yes	No	No
Pradela *et al.*[49]	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Santino *et al.*[50]	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
dos-Santos *et al.*[51]	Yes	Yes	Yes*	Yes	Yes	Yes	Yes	No
Schneider *et al.*[52]	Yes	Yes	Yes*	Yes	Yes*	No	Yes	Yes
Vocci *et al.*[53]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No

Figure 01 presents the cross-cultural adaptation steps of the studies:

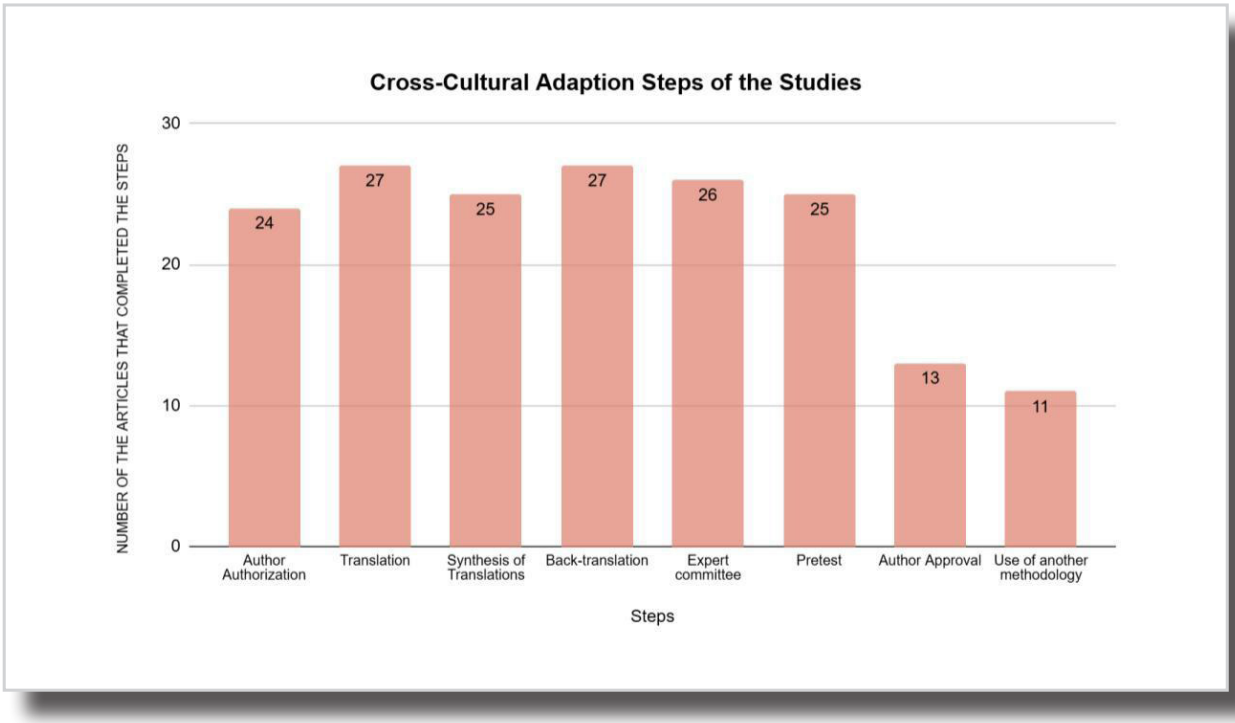

Figure 1 - Cross-Cultural Adaptation Steps in the Studies.

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Among the 27 articles, 7 followed all the steps in accordance with the methodology under investigation in this study, without any modifications to the process of developing the cross-culturally adapted version specifically in the steps of translation, synthesis of translations, back-translation, expert committee, and pretesting. These studies were: Gayoso *et al.*[28], Melo Filho *et al.*[33], Logullo *et al.*[41], Maggi *et al.*[42], Monteiro *et al.*[46], Pradela *et al.*[49] and Vocci *et al.*[53].

It was observed that 20 articles made modifications to the steps proposed by Beaton *et al.* (2000)[3], with particular emphasis on the pretesting phase, which was altered in 11 studies; followed by the synthesis stage in 7 studies; translation in 6; expert committee in 5; and back-translation in 2 studies.

Among the analyzed articles, 11 reported following the guidelines of other methodologies in addition to those proposed by Beaton *et al.*[3], combining them. These included: Borges *et al.*[30], who adopted recommendations from Coster & Mancini (2015) and the authors of the CRE Care instrument (2015); Garcia *et al.*[34], who used Bullinger et al. (1998); Gvozd *et al.*[36], who followed both Beaton *et al.* and the WHO (2017); Jomori *et al.*[37], who also cited Reichenheim & Moraes (2007); Kamonseki *et al.*[38] , who mentioned Wild *et al.* (2005); Logullo *et al.*[41], who also followed Reichenheim & Moraes (2007); Marquito *et al.*[43], who emphasized Herdman *et al.* (1997) and Bullinger *et al.* (1998); Monteiro *et al.*[47], who referred to Mokkink *et al.* (2010); Pradella *et al.*[49], who followed Bullinger *et al.* (1998); Santino *et al.*[50], who used Mokkink *et al.* (2010) and Acquadro *et al.* (2008); and Schneider *et al.*[52], who incorporated both Beaton *et al.* and the International Test Commission (2017).

The following analysis highlights how each step was conducted, aiming to identify how the studies have been carried out based on the methodological reference proposed by Beaton *et al.*[3]:

- Prior Authorization from Authors: Of the 27 studies, 3 did not mention having requested authorization: Augusto *et al.*[29], Calado *et al.*[31], and Gonçalves *et al.*[35].

- *Step 1 - Translations:* This step was described in all studies; however, some changes were observed regarding the number and profile of translators in six articles. Augusto *et al.*[29] recruited two translators unfamiliar with the instrument's subject matter, although the methodology recommends one informed translator and one layperson. Borges *et al.*[30] carried out both translations into Brazilian Portuguese in pairs, with health professionals only no lay translator. Krug *et al.*[39] and Lapas *et al.*[40] selected two translators with domain knowledge instead of one being lay, aiming for more accuracy. Mathias *et al.*[44] used three domain experts instead of including a layperson. Carneiro *et al.*[32] conducted the translation with only one translator.

- *Step 2 – Synthesis of the Translations:* This step was absent in two studies: Calado *et al.*[31] did not mention it, and Carneiro *et al.*[32] skipped it due to having only one translator. Beaton *et al.*'s methodology recommends that both translators and an observer or judge carry out this step. However, seven studies showed variations: Kamonseki *et al.*[38], Lapas *et al.*[40], and Mathias *et al.*[44] used the same group for this step and the expert committee. Monteiro *et al.*[47] involved professionals experienced in cross-cultural adaptation. Nagumo *et al.*[48] performed the synthesis with just one translator, who had not participated in the initial translation. Dos-Santos *et al.*[51] synthesized the translations with one translator, with validation from the initial translators. Schneider *et al.*[52] conducted the synthesis solely by the study author.

- *Step 3 – Back-Translations:* This step was described in all studies. Alterations were found in two articles: Carneiro *et al.*[32] used only one back-translator, instead of two. Marquito *et al.*[43] synthesized the two back-translations before comparing them with the original version, which is not part of the original methodology.

- *Step 4 – Expert Committee:* One study did not describe this step: Fernandes *et al.*[27] While the methodology specifies both the number and profile of experts, five studies described deviations: Kamonseki *et al.*[38], Lapas *et al.*[40] and Mathias *et al.*[44] used the same team as in the synthesis step; Krug *et al.*[39] included the instrument developer in the committee; Schneider *et al.*[52] conducted the committee stage with only two professionals.

- *Step 5 – Pretesting:* The methodology recommends applying the instrument with 30 to 40 participants, followed by interviews. Nine studies used fewer participants: Augusto *et al.*29 used 10; Carneiro *et al.*[32] tested two groups (14 and 15 participants, totaling 29); Garcia *et al.*[34] had 18; Gonçalves *et al.*[35] had 24; Gvozd *et al.*[36] had 25; and Lapas *et al.*[40] used 20, Marquito *et al.*[43] used 10; Mesquita *et al.*[45] had 25; e Monteiro *et al.*[47] used 20. Calado *et al.*[31] and Jomori *et al.*[37] applied test–retest procedures to verify validity, rather than applying the full translated version followed by interviews. Additional deviations were observed: Logullo *et*

al.[41] and Vocci *et al.*[53] did not report the number of participants. Santino *et al.*[50] and Schneider *et al.*[52] did not explicitly report conducting a pretest, though Schneider *et al.* described a cognitive debriefing step involving interviews only, without full instrument application. In total, 15 studies presented deviations from Beaton *et al.*'s methodology for this step.

- *Step 6 – Final Stage:* Twelve studies did not report submitting the final version to the original instrument's author: Gayoso *et al.*[28], Borges *et al.*[30], Augusto *et al.*[29], Calado *et al.*[31], Gonçalves *et al.*[35], Jomori *et al.*[37], Kamonseki *et al.*[38], Logullo *et al.*[41], Maggi *et al.*[42], Mesquita *et al.*[45], Nagumo *et al.*[48], and Pradella *et al.*[49].

Still regarding the modifications, 10 articles added steps to the cross-cultural adaptation process. For instance, Fernandes *et al.*[27] conducted a preliminary translation that is not included in the original methodology. Borges *et al.*[30], after obtaining permission from the original authors to carry out the adaptation, added a step before the translation: three professors analyzed the conceptual equivalence and relevance of the items for the Brazilian population. Schneider *et al.*[52], after the synthesis stage, included a content evaluation of the synthesized version by two focus groups totaling 17 participants. Mesquita *et al.*[45] inserted an additional stage between the expert committee and pretesting, in which the translated version was submitted to professionals from across the country with English proficiency to assess clarity, applicability, and socio-educational relevance. Nagumo *et al.*[48] formed a second committee following the initial expert review to evaluate the instrument's content in terms of clarity, practical and theoretical relevance, and dimensionality of the items.

Dos-Santos *et al.*[51], after the back-translation stage, included a review by the original instrument's author, who approved the version with modifications to ensure equivalence. After the expert committee phase, they added a second evaluation by the same committee regarding the instrument's theoretical and practical relevance and clarity. Gayoso *et al.*[28] conducted a peer review step after pretesting, during which two experts evaluated the entire process and compiled the final version to begin validation. Borges *et al.*[30] also included post-pretest test–retest and inter-rater reliability assessments as part of the validation. Logullo *et al.*[41] added a semantic evaluation and translation consolidation after the expert committee stage, followed by a second semantic evaluation as the final step. Santino *et al.*[50], after back-translation, conducted a synthesis involving the two native English-speaking translators and one external researcher to compare the versions, check semantic equivalence, and consolidate a single version. Subsequently, a Portuguese language reviewer performed an item adequacy review. Additional modifications included a cognitive debriefing with 31 participants after the expert committee stage to assess item comprehension among the target population. The original author of the instrument was contacted throughout the entire process, approving the work at the beginning, after Step 3 (synthesis of translations), after Step 6 (synthesis of back-translations), and at the end (after cognitive debriefing).

Furthermore, 6 articles altered the order of the steps: Gvozd *et al.*[36], Schneider *et al.*[52] and Logullo *et al.*[41] performed the back-translation after the expert committee stage rather than before. Lapas *et al.*[40] and Garcia *et al.*[34] obtained approval of the Brazilian Portuguese version from the original author during the back-translation stage, instead of after pretesting. Monteiro *et al.*[46] reported obtaining the authors' authorization and approval only after the back-translation stage, and not at the beginning of the process although it was conducted together with the translation step.

DISCUSSION

Due to differences in behaviors and meanings of individuals' experiences across cultures, the use of assessment instruments in different countries or cultural contexts requires a process of equivalence analysis between the original instrument and its translation[54].

In the analysis of 36 articles focused on the cross-cultural adaptation of health-related instruments, the methodology proposed by Beaton *et al.*[1,3] was prominently adopted in 27 studies, aiming to enable the use of assessment instruments in health contexts across different countries.

Given that most of the studies introduced modifications to Beaton *et al.*'s methodology[3], it is worth highlighting the researchers' need to alter, add, or omit certain procedures. This raises questions about the actual effectiveness of Beaton *et al.*'s guidelines[3] within the Brazilian context.

Most studies did not report the contextual reasons

for such modifications, which may be an important aspect to consider in future research, with the aim of better understanding the possibilities for cross-cultural adaptation studies in Brazilian Portuguese.

The flexibility shown by authors in modifying steps beyond what was established by Beaton *et al.*[3], may have aimed either to enhance the rigor of developing the new instrument version or to facilitate the process such as by reducing the number of steps, altering their order, changing the professional backgrounds of the team members, or conducting procedures that were only partially aligned with Beaton's methodology. These modifications appear to have enabled the process to be carried out within the study's context and do not seem to have compromised the development of new versions of the instruments. Nevertheless, the guidelines recommend completing all the steps of the selected methodology to ensure the highest possible equivalence between the new version and the original, while respecting cultural differences.

This reveals an ambiguous situation that may need to be reconsidered in light of current practice in Brazil. It may be time to reflect on whether these guidelines truly meet the needs of the Brazilian context in adapting instruments developed in other countries. Some key points in the current methodology, if modified, could contribute to a more effective cross-cultural adaptation process for example, the lack of requirement for professional translators, relying solely on native speakers without necessarily having expertise in linguistics or translation. New methodologies and procedures could gain more prominence and become integral to cross-cultural adaptation processes.

Despite the widespread modifications, the importance attributed to Beaton *et al.*'s methodology[3], remains clear: the translation and back-translation steps were conducted in all studies; the expert committee was omitted in only one; the synthesis step was missing in only two; and the pretesting step was not performed in only two studies. This further supports the need for future research investigating the motivations behind each modification, to better understand the range of possibilities in cross-cultural adaptation studies for Brazilian Portuguese.

With regard to participant sample composition and the clarity of how procedures were conducted both crucial for the cross-cultural adaptation process the studies generally presented good descriptions. It is essential that published texts provide access to the new versions of the instruments to ensure their use by professionals in the country, and to support future research.

In line with these findings, Ferreira *et al.*[11] state that although several guides have been proposed for creating new instrument versions, challenges remain in executing the steps required for proper adaptation. Based on the Brazilian context, those authors suggested some adaptations such as reducing the pretest sample to 5–10 participants instead of 30–40 which was replicated in six other studies and yielded positive results, especially when participants closely matched the target profile. They also proposed adding a representative of the instrument's target population to the expert committee, which helped reduce item comprehension issues during pretesting. Furthermore, although these adaptations were only implemented in Brazil and in instruments assessing specific constructs, they contributed to a faster and more cost-effective process[11].

In summary, gaining a better understanding of the Brazilian context may prove valuable in developing specific guidelines for Brazilian Portuguese, given the increasing relevance and frequency of this type of research in the country as evidenced at the outset of the present study.

CONCLUSION

This systematic review demonstrated that selecting a methodological framework with clear recommendations for the cross-cultural adaptation process is highly relevant for generating a new version of an instrument in a different cultural context.

The combination of qualitative strategies such as content analysis based on feedback from expert committee members and pretest participants and quantitative strategies (e.g., statistical item analysis) is also essential to achieving expected outcomes during the adaptation process. Once the adapted version is approved, it can be made available for use and further validation by other professionals, thereby enhancing clinical practice through the implementation of new assessment instruments.

This study showed that the guidelines proposed by Beaton *et al.*[3] have proven feasible and applicable to Brazilian cross-cultural adaptation studies. However, modifications have occurred: of the 27 articles analyzed, only 7 fully followed the proposed steps. This suggests the need to continue studying the Brazilian context to better understand the country's specific practical needs.

Beaton *et al.*[3] remains a key reference in the literature and is cited even in studies that do not follow the exact methodology. However, developing guidelines

tailored to Brazil could enhance practice and enable comparative studies between methodologies, helping ensure the quality of adaptation processes in the Brazilian context. Such national guidelines could also streamline the work of Brazilian researchers in selecting appropriate methodologies and designing research stages.

One limitation of this study is the likelihood that some relevant studies were not captured in the search. Four databases were used: BVS (Virtual Health Library), created by PAHO/WHO; CINAHL (Cumulative Index to Nursing and Allied Health Literature), maintained by EBSCO; MEDLINE (Medical Literature Analysis and Retrieval System Online), created by the United States National Library of Medicine; and SCOPUS, which indexes scientific, technical, medical, and social science literature and is maintained by Elsevier. Some journals may not be indexed in these databases, which represents a limitation of the search process.

Nonetheless, this review contributes to the discussion on the development of cross-cultural adaptation processes for instruments within the Brazilian context.

CRediT author statement

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All authors have read and agreed to the published version of the manuscript.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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