Patient Preference and Adherence

Dovepress
Taylor & Francis Group

Open Access Full Text Article

ORIGINAL RESEARCH

Validation Of The Asthma Self-Management Questionnaire For The Brazilian Population

Lenice Daiane da Costa Lopes[1], Maria Luíza de Araújo Teixeira[2], Layane Priscila Costa da Silva[2], Jose Alexandre Barbosa Almeida[3], Lucien Peroni Gualdi[1–3]

[1]Graduate Program in Rehabilitation Sciences at the Federal University of Rio Grande Do Norte - Faculty of Health Sciences of Trairi, Santa Cruz, Rio Grande do Norte, Brazil; [2]Undergraduate Program in Physiotherapy at the Federal University of Rio Grande do Norte - Faculty of Health Sciences of Trairi, Santa Cruz, Rio Grande do Norte, Brazil; [3]Graduate Program in Physiotherapy at the Federal University of Rio Grande do Norte - Faculty of Health Sciences of Trairi, Santa Cruz, Rio Grande do Norte, Brazil

Correspondence: Lucien Peroni Gualdi, Email lucien.gualdi@ufrn.com.br

Introduction: The lack of instruments to assess asthma self-management in Brazil highlights the need to develop specific tools to help patients manage their own health condition.

Objective: The study aimed to translate, cross-culturally adapt, and evaluate the psychometric properties of the Asthma Self-Management Questionnaire (ASMQ) for the Brazilian adult population diagnosed with asthma.

Materials and Methods: This is a methodological, exploratory, and descriptive study approved by the Research Ethics Committee (CEP) of the Federal University of Rio Grande do Norte (UFRN) under opinion number 6.062.022. The study followed international guidelines to design and execute six stages: translation, synthesis of translations, back-translation, synthesis of back-translations, Multidisciplinary Committee of Experts, and pre-testing. For the translation phase, five judges participated using the Delphi Technique through the Multidisciplinary Committee of Experts. For the cross-cultural adaptation, a pre-test phase was conducted using a questionnaire applied to individuals who met the eligibility criteria. Data analysis was performed using SPSS statistical software, version 22.0, with a significance level of 5%.

Results: The translation and cross-cultural adaptation of the ASMQ-Brazil to Brazilian Portuguese were completed. The results of this study demonstrated a Content Validity Index (CVI) greater than 0.80 for all items in the instrument. The ASMQ-Brazil is presented as a valid and reliable health measurement instrument for assessing asthma self-management in the Brazilian adult population.

Keywords: self-management, asthma, validation study, questionnaire

Introduction

Individual's ability to manage continuous care regarding several diseases, such as asthma, can be characterized as self-management. In the health context, this term involves acquiring or improving patients' skills to handle biopsychosocial issues.[1] Therefore, it is expected that individuals with asthma develop these skills to reduce exacerbation episodes and fatal outcomes.[2]

An individual with asthma should have knowledge about their own health condition and be able to manage the characteristic signs and symptoms of the disease, as well as triggering factors, in order to control it through proper adherence to the therapeutic plan, which includes physical exercises, environmental control and medication, among others.[3]

The literature reveals that asthma self-management has become a fundamental resource in the treatment of chronic diseases, including asthma, which require a proactive approach from patients.[4] This process helps optimize the use of healthcare resources and prevents the need for more complex care.[2]

Various instruments have been developed to assess self-management performance in the context of chronic diseases such as COPD, Diabetes Mellitus, Rheumatoid Arthritis, Multiple Sclerosis, and others[4–7] However, only two instruments with the same purpose were found to promote asthma self-management: the Perceived Control of Asthma

Received: 16 November 2024
Accepted: 18 February 2025
Published: 10 September 2025

Questionnaire (PCAQ)[8] which later had its validity potentially compromised and was retracted by its authors,[8] and the Asthma Self-Management Questionnaire (ASMQ).[9]

The ASMQ was developed in English in the USA in 2009 and aims to measure the management ability of adult individuals with this condition. The tool is a self-administered questionnaire consisting of 16 items, with a scoring system calculated by summing the correctly marked assertions, which is then divided by the total number of questions (16) and multiplied by 100 to generate a score range from 0 to 100 points. The interpretation of the score is not clearly established; however, it can be inferred that the higher the score, the better the asthma self-management.[9]

Given the importance of self-management in the context of chronic diseases such as asthma, and the absence of a validated instrument for the Brazilian population, the aim of this study was to validate the ASMQ cross-culturally for the Brazilian population.

Materials and Methods

Study Design

The research is characterized as a methodological, exploratory, and descriptive study, in which the translation and cross-cultural adaptation of the ASMQ for the Brazilian population were conducted.

Ethical Aspects

This study was approved by the Ethics Committee of the Federal University of Rio Grande do Norte (UFRN) - Faculty of Health Sciences of Trairí (FACISA), under the approval number 6.062.022 and Certificate of Presentation of Ethical Review (CAAE) under the approval number 68511723.1.0000.5568. All participants were informed about the study aim and signed the Informed Consent Form (ICF). Furthermore, this study followed the Declaration of Helsinki by the World Medical Association.[10]

Linguistic Validation Protocol: Validation of the ASMQ Instrument

The study followed the recommendations of Beaton[11] and the Consensus-based Standards for the Selection of Health Measurement Instruments (COSMIN),[12] to ensure better selection of health tools based on scientific evidence.[13] Figure 1 presents the study stages.

Initial Translation – First Stage

Two native Portuguese speakers fluent in English translated the instrument independently into Brazilian Portuguese using easy-to-understand language.

Synthesis of Translations – Second Stage

The two translations were synthesized into a single document. The reviewing committee, composed of two lead researchers, reviewed, adjusted, and recorded the changes, resulting in the final translated version to Brazilian Portuguese.

Back Translation – Third Stage

Two native English speakers fluent in Portuguese, carried out the back translation independently, without any access to the original version.

Synthesis of Back Translations – Fourth Stage

The reviewing committee compared the two back translations, and after reviewing them, consolidated them into a single version in English to match with the original version.

Review by the Multidisciplinary Expert Committee – Fifth Stage

The Expert Panel technique was used to ensure the validation of the instrument. The panel, composed of specialists from various fields, had a total of six participants. Using the Delphi Technique via Google Forms®, experts performed

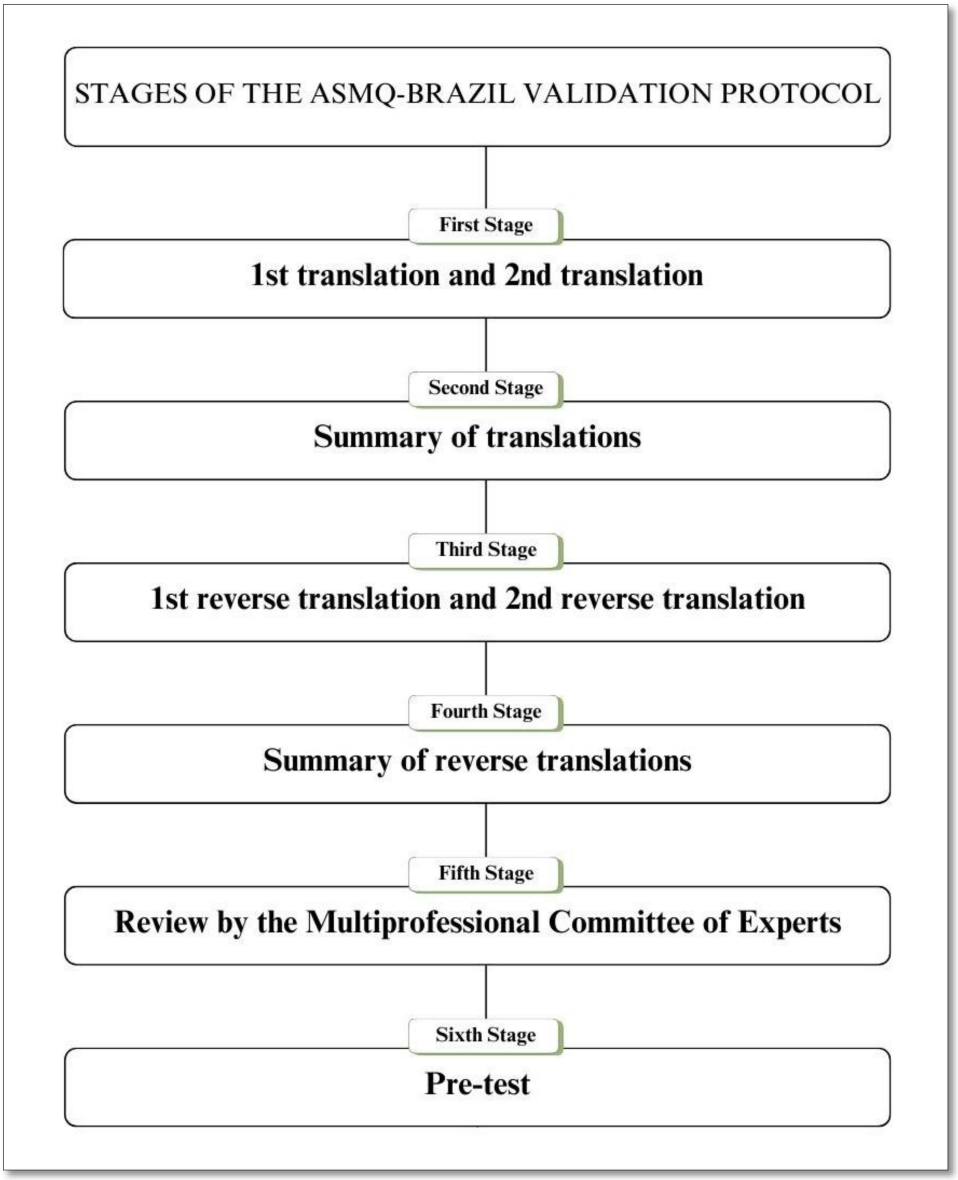

Figure 1 Flowchart of the validation protocol of ASMQ-Brazil for the Brazilian population. Image source: own authorship.

individual and confidential analyses to assess the equivalences of the evaluated items. This evaluation was conducted through an electronic document provided by the researchers for Equivalence Assessment.

The results were evaluated quantitatively using a numerical scale structured as follows: 1 – totally agree, 2 – partially agree, 3 – partially disagree, and 4 – totally disagree. The evaluators rated each item and provided justification, considering objectivity, efficiency, and cultural appropriateness. The Content Validity Index (CVI), considering values >0.80, was used to assess items validity. Items with CVI ≤0.80 were reanalyzed until an agreement was reached.

Pre-Test – Sixth Stage

Participants with confirmed diagnosis of asthma were recruited via Instagram, WhatsApp, email, and "buzz marketing". Participants who agreed to participate signed the ICF before completing the form. ICF and the instrument were assessed through a link or QR code.

They all received a link or QR code to access the form at their convenience. Each participant was instructed on the aim of the pre-test and encouraged to suggest changes to improve the clarity of the items. To assess the items

comprehension, instructions were detailed in the form. A Pre-Test Record Instrument was applied using a Comprehension Rating Score, composed of three items: 0 - not clear, 1 - somewhat clear, and 2 - clear. This was administered through a guide table embedded in the form and for each item of the ASMQ. A Content Validity Index (CVI) above 80% was considered satisfactory.

After the pre-test, the final version was sent to the original author for approval.

Study Framework

This validation study was conducted digitally using the Google Forms® online platform for data collection. The study followed the steps described by Beaton et al[11] and the COSMIN guidelines.[12]

Population and Sample

For the translation and back-translation stages, participants fluent in both Portuguese and English were included. The Expert Committee was composed of six members: two respiratory therapists, two physicians, one expert in validation studies, and one linguistics expert. The pre-test group included adults aged 18 to 75 years, of both sexes, with a confirmed asthma diagnosis through lung function tests and/or medical reports, prescriptions, or photos of medication used for asthma treatment, according to the 11th Revision of the International Classification of Diseases (ICD-11 – J45).[14]

Inclusion Criteria

Individuals with a confirmed diagnosis of asthma according to the ICD-11 – J45,[14] aged between 18 and 75 years, whether under treatment or not for asthma, and regardless of the severity of the disease, were included.

Exclusion Criteria

Individuals with diseases and/or cognitive impairments that make them unable to understand and/or limit their participation in the study, such as dementia, delirium, or intellectual disability, were excluded, as these conditions would prevent them from being evaluated by the instrument under development.

Selection of Subjects

Location, Recruitment, and Selection of Participants

The study was carried out using digital means, utilizing an online platform, Google Forms®. Invitations to participate in the research were made through prior contact established by the researchers, with the support of volunteer collaborators in dissemination efforts. Various channels were employed, including social media, emails, and face-to-face approaches, targeting healthcare professionals, researchers, and individuals diagnosed with asthma or those who knew someone with the condition.

The dissemination was conducted extensively across all regions of the country through infographics created by the study's researchers. These materials were distributed in hospitals, clinics, universities, public and private companies, and online platforms. Additionally, communication and press agencies supported the dissemination of the study without any financial compensation or other forms of reward.

Furthermore, the sample was selected based on convenience through self-reporting and/or third-party reporting, with confirmation of the asthma diagnosis, regardless of gender, while considering the age and nationality of the individuals. After this initial selection, participants were included or excluded based on a systematic evaluation grounded in the eligibility criteria.

Measurement Instruments and Procedures

The ASMQ[9] and a structured form developed by the researchers, containing questions regarding sociodemographic and clinical data, were applied through Google Forms®. Data collection occurred differently depending on the current stage of the process. The translation and back-translation phases used a free translation approach, which allows more flexibility

to capture not just the direct meaning of words but also the cultural context and nuances of the original text. This method facilitates comprehension and ensures translation effectiveness.

In the fifth and sixth stages, a structured form containing sociodemographic, socioeconomic, and clinical-epidemiological data, as well as an Equivalence Assessment Form, was used. In the Expert Committee stage, the assessment was carried out through an Item Rating Score, and in the Pre-Test stage, through the Comprehension Rating Score. All collected data were recorded and stored in a database by the researchers.

Data Analysis

For data analysis, the statistical software SPSS version 22.0 for Windows (IBM Corporation, Armonk, NY, USA) was used, with a significance level of 5%. To assess data normality, the Shapiro–Wilk test was applied during the Expert Committee stage, and the Kolmogorov–Smirnov test was used during the Pre-Test stage. Continuous variables with parametric distribution were represented as mean and standard deviation, while non-parametric variables were represented as median and interquartile range. Categorical variables were presented as absolute and relative frequency.

Results

During the translation and back-translation stages, four translators fluent in both Portuguese and English languages were included. The translated versions were reviewed and analyzed by the review committee, leading to the final descriptive version of the Asthma Self-Management Questionnaire (ASMQ), which was used in the Expert Committee and pre-test stages.

Evaluation by the Multidisciplinary Expert Committee

Six participants were included, consisting of two respiratory therapists, two physician's experts in intensive care, one expert in instrument validation, and one linguist expert in Brazilian Portuguese. During this phase, two physicians were excluded due to lack of participation. A new participant with experience in intensive care was invited, and after its inclusion, the study continued with five experts,[15] as recommended for content validity assessment when adapting health measurement instruments.[16]

The mean age of the expert committee was 37.6 ± 8.82 years, and 80% (n=4) were females. Furthermore, 60% (n=3) self-identified as white. The average time of professional experience was 12.8 ± 8.58 years, and 60% (n=3) held a PhD degree. Among the participants, 60% (n=3) reported previous experience with this type of study.

The Expert Panel technique was used to assess the Content Validity Index (CVI). In this phase, three rounds were necessary to achieve a CVI greater than 0.80 for all items of the instrument. In the first round, only items 1, 2, 4, and 11 showed CVI scores below 0.80. The subtitle and items 3, 5, 6, 7, 8, 9, 10, and 15 achieved a CVI of 0.83. The title and items 12, 13, 14, and 16 achieved a CVI of 1.0. However, all items of the instrument, except for the title, received modification suggestions, which were accepted by the review committee after discussion.

In the second round, all items of the instrument, except the title, were evaluated. Regarding the values found in the experts' evaluation, all items obtained a CVI of 1.0, except for item 2. Additionally, items 2, 4, 5, 10, and 11 were revised according to the suggested modifications made by the Expert Committee. Finally, all items assessed in the third round obtained a CVI of 1.0, concluding this phase. Table 1 presents the suggestions made by the Expert Committee.

Pre-Test Evaluation

After completing the electronic form, 37 participants were recruited. Of these, five participants were excluded due to eligibility criteria, resulting in a final sample of 32 participants. The sample consisted of 18 female participants (56.3%) with a mean age of 34.93 ± 11.17 years, and white ethnicity (68.8%; n=22) predominantly.

Additionally, 100% of the participants were residents of the Northeast region of Brazil. Regarding educational level, 65.6% (n=21) had higher education, such as undergraduate or postgraduate degrees. In terms of professional profile, it was observed that 12.5% (n=4) were unemployed at the time of data collection, 12.5% (n=4) were students, 9.4% (n=3) were public employees, 9.4% (n=3) were physiotherapists/respiratory therapists, and 56.2% (n=18) had another occupancy.

Table 1 Description of the Suggestions Made by the Multidisciplinary Expert Committee During the Validation of the Asthma Self-Management Questionnaire

Expert Committee Stage		
	1st Stage Suggestions	**2nd Stage Suggestions**
Subtitle	1. Instead of "tick" I suggest "mark" as it is a more informal and easier-to-understand term. I recommend reconsidering the term "questioning" as the items are not questions per se. Perhaps using the term "item" or "statement" would be more appropriate.	1. I suggest replacing the word "questioning" with "question."
Item 1	1. I suggest changing the question to: "The main strategy to prevent asthma attacks is" and I suggest after "steroids" (in alternative b, explain what "steroid medications" are in more accessible language). 2. In letter B, "taking steroid medications" should be "taking control medications (corticosteroids)". Patients do not understand what "steroids" are. 4. Avoid contact with allergens.	1. The best way to prevent asthma from getting worse is to. 2. In letter A, leave out: "take medicine before eating". In letter B, leave out: "use control medicines (such as corticosteroids, such as prednisone, prednisolone, beclomethasone and budesonide)". In letter C, leave out: "get the flu vaccine". In letter D, leave out: "go to the hospital when you feel the first symptoms".
Item 2	1. I suggest changing alternative B to: "It's the same as four inhalations at once". 2. Patients do not understand what an "inhaler" is. I suggest replacing it with "pump". Inhalations can also be confused with the use of a nebulizer, but the original says "puffs", so it would be better to replace inhalations with jets (in the item). 3. In this regard, it is possible to confuse the "prescribed inhaler" with the "short-acting beta agonist inhaler". This may be a little confusing for the patient.	1. In letter A, leave: "It's the same as doing just one spray four times a day." In letter B, leave: "It's the same as four sprays just once a day."
Item 3	1. In letter B, I was unsure whether they are still talking about "control medication"? I believe so, so I suggest specifying "control medications". The patient may not understand which medication they are referring to.	1. In letter C, write: "You should still avoid exposure to triggers." 2. Replace the abbreviation "ex" with the full term. People with little education may not understand.
Item 4	1. I suggest replacing the word "maintenance" with "asthma control". 2. I have doubts about the expression "asthma maintenance". Would it be the same if we referred to "maintenance of asthma treatment"? 3. In Brazil, especially in the Northeast, the term "maintenance medications" is not very common. I suggest replacing it with "control" or keeping both terms control/maintenance. 4. In letters B, C and D, I suggest putting "taken or used" to include the use of the inhaler. 5. I suggest replacing "maintenance" with "control" or "stability".	1. In letter C, change to "do".
Item 5	1. Patients do not know what "peak flow" is, so I suggest putting something like "the correct way to use "a peak flow measuring device is.". That way, at least, they will have a better idea of what it is, and it will be easier to identify that they are not familiar with this equipment/device.	1. I suggest changing or explaining better the definition of "peak flow". 2. Review the verb tense to be in accordance with the item's statement. 3. The correct way to use a device that measures peak flow is: a. Take a deep breath and then blow slowly into the mouthpiece. b. First, exhale and then place your mouth on the mouthpiece. c. Place the mouthpiece in your mouth and then pull and release the air. d. Take a deep breath and then blow into the mouthpiece as fast as you can. e. I do not know.
Item 6	1. Rescue = rescue medication (bronchodilator). I suggest putting it like this! 2. Patients do not understand "emergency medication". 3. In letter D, replace it with something like "Rescue medication does not cause you to develop tolerance to the medication". Also, I suggest explaining it in a more layman's terms. Maybe add something in parentheses or put "ie" at the end and include something more simplified. Patients may not understand and it may cause a lot of problems in the following phases.	1. Is this expression "rescue medicine" used by laypeople?

(*Continued*)

Table 1 (Continued).

Expert Committee Stage		
	1st Stage Suggestions	**2nd Stage Suggestions**
Item 7	1. Inhaler = pump. 2. In letter A, let: "breathe shallowly". In letter D, let: "press the pump several times while drawing air". 3. Patients may not understand the term "inhaling". 4. I suggest replacing or adding the term "inhaler" in parentheses with "pump".	1. Leave it like this: "When using your inhaler, you should." a. Take short breaths b. Take a quick breath c. Take a slow breath d. Squeeze the inhaler several times while taking in air e. I do not know.
Item 8	1. Inhaler = pump 2. In letter B, leave: "you should take the second dose as soon as possible after the first". In letter C, leave: "continue the doses until you feel better". In letter D, leave: "Wash the pump". 3. I suggest replacing or adding the term "inhaler" in parentheses with "pump".	1. Leave: "After using the pump, you should." a. Hold your breath for a while b. Take the second dose right after the first c. Take more doses until you feel better d. Wash the pump in a bowl of water e. I do not know.
Item 9	1. In letter A, leave: "control medications (corticosteroids)". 2. In letter B, if you have flexibility with the author, I suggest adding "call or seek medical advice". 3. In the reality of the SUS, few patients have access to doctors in this way, so if you leave it as it is, it will be an item that is rarely marked.	There were no suggestions.
Item 10	1. I suggest changing the expression "more medication" to "higher doses of medication". 2. Emergency medication = rescue (bronchodilator). Replace and insert both terms. In letter B, replace "E" with "is". In letters C and D, review the suggestions for "maintenance medication".	1. I suggest changing it to: "Take more rescue medications (bronchodilators) than your doctor prescribed.". 2. In letter C, leave: "may mean that you can take fewer regular medications (corticosteroids)." In letter D, leave: "may mean that you need more control medications (corticosteroids)."
Item 11	1. In item A, I suggest replacing "lung function" with changes in breathing or lungs, since changing peak flow does not necessarily mean changing lung function, since this involves other variables such as CFV, VEF1, among others. In addition, I suggest standardizing the answers. 2. See the suggestion about "peak flow" in item 5. In the item itself, I suggest putting "is that." at the end. In letter A, I suggest replacing "changes" with "changes". Changes can already give a negative connotation of worsening. Patients will not understand "lung function". It would be better, perhaps, to write something like "ability to breathe" or keep both terms and this simpler form in parentheses. In letter B, "reduce the use of medications?" might be better. In letter C, leave: "you can see how well you can breathe". 3. I suggest replacing "detect" with "identify", in alternative A.	1. Same suggestion as item 5 for defining "peak flow." 2. In letter A, leave ".identify small changes in your lungs." In letter B, I think "decrease your medications" is confusing. Decrease what? The dose or the frequency of use? 3. Leave the alternatives like this: a. Helps you notice if your breathing or lungs are changing, even before you feel sick. b. Can show you when it's time to take less medication. c. Shows how much air you can draw in. d. Helps you see how you are doing compared to other people with asthma. e. I do not know.
Item 12	1. Modify the statement and leave it as follows: "For people with asthma, exercise.".	There were no suggestions.
Item 13	1. In letter C, leave: "using a peak flow measuring device".	There were no suggestions.
Item 14	1. Asthma attacks. In letter B, write: "can occur in the presence of several triggers together".	There were no suggestions.
Item 15	1. Describe what "steroids" are in parentheses. 2. Replace with "corticoid tablets" In letters A and B, replace with "while you are taking the pills". In all items, "take the pills" should be translated as taking the pills, because the item refers to oral corticosteroids. In letter D, leave: "You should finish using the prescribed medication even if you feel.".	There were no suggestions.

Furthermore, 68.8% (n=22) of the sample reported not having been hospitalized during the last 12 months due to asthma exacerbation. In addition, 84.4% (n=27) do not smoke, and 53.2% (n=17) do not consume alcohol or are former consumers. Regarding lifestyle habits, 68.8% (n=22) reported engaging in physical exercise with a homogeneous frequency variance. It is also worth noting that 75% (n=24) of the sample reported experiencing shortness of breath during or after physical exercise, and 78.1% (n=25) do not feel that asthma affects their family relationships, as shown in Table 2.

In the pre-test group, two rounds were necessary to achieve a CVI greater than 0.80 for all items of the instrument. In the first round, only item 2 scored a CVI lower than 0.80 (CVI = 0.78). However, the subtitle and items 1, 2, 3, 8, and 14 received suggestions. Of these, only items 2, 3, and 14 had their suggestions accepted by the review committee as the suggestions may change the original meaning of the question. Additionally, the statement and/or the alternatives for items 6, 10, and 11 were modified.

In the second round, all items scored above 0.80. Table 3 presents the findings described above.

After completing all the stages and receiving approval from the original author, the validated ASMQ-Brazil version was generated, as shown in the supplementary file 1.

Discussion

Considering the aims of the study, it was possible to complete the validation process of the ASMQ-Brazil. Thus, after the evaluation by the expert committee and the pre-test group, all items achieved a Content Validity Index (CVI) higher than 0.80 as recommended by the literature.[17.]

Several asthma self-management models promote different levels of adherence among users. According to a systematic review,[2] regular self-management interventions with supervision and/or follow-up by multidisciplinary teams result in significant reductions in healthcare use and improvements in quality of life, regardless of disease severity. In this way, self-management tools produce statistically and clinically significant impacts on asthma knowledge,[18] directly reflecting on disease control and the quality of life of affected individuals.

In this context, the ASMQ[9] was developed to assess patients' ability to independently manage asthma. In addition to being a simple and self-administered tool, the ASMQ also promotes autonomy and provides healthcare professionals with personalized data that can optimize treatment. Despite the advantages of the ASMQ-Brazil, there are challenges regarding patients' comprehension accuracy and sincerity in answering.

Several studies[19,20] have explored the use of the ASMQ in clinical and research contexts. In a study conducted in Vietnam,[20] the translation of the ASMQ followed the guidelines of the World Health Organization (WHO),[21] involving direct translation, back-translation by a panel of experts, pre-testing, cognitive interviewing, and the development of the final version. However, the guidelines and translation stages followed differ from those adopted in our research. Moreover, we have not performed a cognitive interview. However, most of the sample included in our study showed good comprehension and education.

In contrast, in our study, in addition to the mentioned stages, we performed back-translation and a review by a Multidisciplinary Expert Committee. It is important to note, however, that the absence of these stages in the process may affect the accuracy of the translation and the cultural equivalence of the instrument, which should be considered in future validations.

A recent cohort study conducted in Pakistan used the ASMQ to assess patients' asthma management.[22.] In it, two items related to peak flow were omitted, justified by the fact that this equipment is rarely used in developing countries. Similarly, our study found borderline CVI results for one item (item 11) that discusses the same equipment. Therefore, it is possible to assume that the result found is related to the lack of knowledge about this resource, combined with the lack of instruction and recommendation by healthcare professionals on its importance in daily evaluations to predict the risk of exacerbations.

The adequate results of the IVC values for all items of the ASMQ supported the decision not to exclude any item from the questionnaire in this research. Furthermore, a psychometric study would be more appropriate to make an informed decision about excluding items, which did not occur in studies similar to ours[22] that excluded items from the questionnaire.

Table 2 Clinical-Epidemiological Profile of Participants in the Pre-Test Stage

Variable	M±SD ou N (%)
Physical activity frequency	2,03±0,82
0 X/week	10 (31,3%)
1 to 3 X/week	11 (34,4%)
3 or more X/week	11 (34,4%)
Medications used at the time of data collection	
Salbutamol Sulfate	18 (56,2%)
Formoterol + Budesonide	8 (25%)
Beclomethasone + Salbutamol	3 (9,3%)
Associated comorbidities	
Respiratory diseases (COPD, cystic fibrosis, etc.)	29 (90,6%)
Systematic Arterial Hypertension	7 (21,9%)
Diabetes Mellitus	2 (6,2%)
Time since asthma diagnosis (years)	18,28±13,52

Abbreviations: M, Mean; SD, Standard Deviation; N, Absolute values and %, Percentage value.

Table 3 Description of CVI Values and Suggestions Received for Each Item During the First and second Rounds of the Pre-Test Stage

PRE-TEST STAGE			
	1st Round	**2nd Round**	**Suggestions**
Title	0,938		No suggestions
Subtitle	0,906		1. "Is this a subtitle or an error? It seems more like a ctrl+c ctrl+v mistake than a subtitle."
Item 1	0,906		1. "I think that when considering asthma prevention, we should also keep in mind individual main triggers like allergies, for example. Avoiding the known allergen is also one of the main forms of prevention in cases of recurrent asthma due to allergens. Would it be interesting to add this information to this question or to include a specific question on this topic?"
Item 2	0,781	0,833	1. "The question may not be very objective for everyone!" 2. "It's a bit confusing because some inhalers do not work this way, and the patient may not have used this type of inhaler described in the statement." 3. "Option D is a little difficult to understand what it means. Perhaps changing it to a positive statement would make it clearer, for example: 'You should exclusively follow this recommendation,' or something like that."
Item 3	0,875	0,9	"At the end of the question, you could add the term 'means that'."
Item 4	0,906		No suggestions
Item 5	0,906		No suggestions
Item 6	0,875	0,867	No suggestions
Item 7	0,938		No suggestions

(*Continued*)

Table 3 (Continued).

PRE-TEST STAGE			
	1st Round	2nd Round	Suggestions
Item 8	0,906		1. "I suggest adding the words 'immediately after using'."
Item 9	0,969		No suggestions
Item 10	0,875	0,833	No suggestions
Item 11	0,813	0,767	1. "I think that in this regard, there may be two correct answers: both comparing with others and being able to identify small changes."
Item 12	0,938		No suggestions
Item 13	0,969		No suggestions
Item 14	0,844	0,967	1. "I believe there is more than one correct alternative, so the question could be which one is incorrect."
Item 15	0,938		No suggestions
Item 16	0,906		No suggestions

Furthermore, the ASMQ was translated and cross-culturally adapted in Saudi Arabia.[23] However, the sensitivity of the study cannot be fully confirmed due to the sample limitation, which consisted exclusively of participants from a single specialized clinic. The pilot study sample, consisting of only 10 participants, was below the number recommended by the guidelines, and the research restriction to a single clinic compromised the validity of the procedures and the generalization of the results.

Besides these limitations, it is important to highlight that the lack of tools for assessing asthma self-management significantly contributes to the challenges faced,[23] as in our study. Currently, there is no official categorization regarding the ASMQ score results. Although a study[20] classified the transformed score as good (ASMQ > 75), adequate (ASMQ between 50–75), and poor (ASMQ < 50), the original author of the questionnaire does not provide specific recommendations, only indicating that higher scores reflect higher levels of self-management without, however, establishing an objective cut-off point for interpretation.[24]

In addition to the lack of tools for assessing asthma self-management, another challenge is the scarcity of instruments that address knowledge about the disease. In 2014, a Brazilian group developed a specific questionnaire to measure asthma knowledgment,[25] which, although not directly focused on self-management, addresses relevant aspects that are also covered by the ASMQ-Brazil. Thus, although there are some initiatives in the area, the absence of comprehensive and validated instruments for self-management remains a significant barrier to clinical practice and research.

Thus, the limitations found in this research should be considered, and they are related to the fact that the pre-test sample consisted only of participants from a single region of Brazil, not representing the entirety of the Brazilian population. Although the sample comes from a single region of the country, Brazil's continental dimensions make it challenging to cover all regions but also allow the analysis of participants from a region rich in cultural and linguistic diversity.

Additionally, the study was conducted exclusively in a virtual environment, which results in the exclusion of patients without access to electronic devices with internet connectivity or low representation from populations where technological accessibility is limited. On the other hand, the virtual environment allows participation by individuals who might not have access to in-person studies.

Another important aspect to consider is the potential response bias related to participants' varying levels of education, which may influence the answers provided. Several studies[26–28] indicate that health self-management is directly associated with educational level. Patients with higher education levels tend to score higher on the ASMQ compared

to groups with lower education levels.[20] This difference may be attributed to the greater capacity of these individuals to integrate the information presented, as well as a better understanding of the instructions conveyed through asthma education and communication.

In our study, 65.6% of the sample consisted of participants with undergraduate or postgraduate education. This proportion may indicate that the participants have a higher capacity to understand and interpret the questionnaire information. This characteristic of the sample enriches the validation of this instrument and contributes to confidence in the results obtained, as it suggests that participants are more able to provide relevant and constructive feedback during the questionnaire validation process.

Finally, it is important to highlight the vast cultural and linguistic diversity of Brazil. Even within the same region, there are significant variations that can affect the understanding and suitability of the questionnaire for the Brazilian population in general. This diversity may lead to varied interpretations of the questionnaire items, thus influencing the consistency and accuracy of the answers. These factors contribute to fostering deeper discussions about the questionnaire's suitability for the diversity of the Brazilian population.

Conclusion

The final version ensures the successful validation of the ASMQ-Brazil, with a CVI greater than 0.8, and the suitability of the tool for use in the Brazilian population diagnosed with asthma. To ensure that the instrument provides reliable and valid measures for this target population, further studies evaluating its measurement properties are necessary.

Abbreviations

ASMQ, Asthma Self-Management Questionnaire; ASMQ-Brazil, Asthma Self-Management Questionnaire for the Brazilian population; CAAE, Certificate of Presentation of Ethical Review; CAPES, Coordination for the Improvement of Higher Education Personnel; REC, Research Ethics Committee; ICD-11, 11th Revision of the International Classification of Diseases; COSMIN, Consensus-based Standards for the Selection of Health Measurement Instruments; FACISA, Faculdade de Ciências da Saúde do Trairí; PCAQ, Perceived Control of Asthma Questionnaire; WHO, World Health Organization; ICF, Informed Consent Form; UFRN, Universidade Federal do Rio Grande do Norte.

Data Sharing Statement

We declare that the data supporting this study are explicitly detailed in the text, and additional data were not included in this article due to space limitations. However, should they be requested, they will be made available.

Ethical Approval and Informed Consent

This research was submitted to the Research Ethics Committee (REC) of UFRN/FACISA and approved under protocol number 6.062.022, following the recommendations for studies of this nature.[29,30] Data collection was conducted after REC approval, and all participants were informed about the structure and nature of the research, including its importance, objectives, risks and benefits, procedures, and the rights of the volunteers who agreed to participate in the study.

Acknowledgments

We would like to thank all collaborators who participated directly or indirectly in this work. Special thanks go to the original author of the ASMQ, Carol Mancuso, as well as the participants in the translation, back-translation, review stages, the Multidisciplinary Expert Committee, and the pre-test. The invaluable participation of everyone allowed us to achieve the results presented here.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically

reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Consent for Publication

The original author of the ASMQ, Carol Mancuso, was contacted prior to the beginning of this research. With her consent and deliberation on the copyright of the translated version, all stages of this study were carried out with her approval.

In addition to the previously mentioned consents, we affirm that all statistical data, ICF, figures, tables, and charts are available for authorial verification.

Funding

This study was partly financed by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – Brasil (CAPES). Finance Code 001.

Disclosure

The authors declare that they have no competing interests.

References

1. Nascimento LS, Gutierrez MGR, De Domenico EBL. Programas educativos baseados no autogerenciamento: uma revisão integrativa. *Rev Gaúcha Enferm*. 2010;31(2):375–382. doi:10.1590/S1983-14472010000200024
2. Hodkinson A, Bower P, Grigoroglou C, et al. Self-management interventions to reduce healthcare use and improve quality of life among patients with asthma: systematic review and network meta-analysis. *BMJ*. 2020;370:1–12.
3. GINA. Global initiative for asthma. global strategy for asthma management and prevetion. 2022.
4. Cravo A, Attar D, Freeman D, Holmes S, Ip L, Singh SJ. The importance of self-management in the context of personalized care in COPD. *Int J Chron Obstruct Pulmon Dis*. 2022;17(231):–243. doi:10.2147/COPD.S343108
5. Cho MK, Kim MY. Self-management nursing intervention for controlling glucose among diabetes: a systematic review and meta-analysis. *Int J Environ Res Public Health*. 2021;18(23):12750. doi:10.3390/ijerph182312750
6. Mollard E, Michaud K. Self-management of rheumatoid arthritis: mobile applications. *Curr Rheumatol Rep*. 2020;23(1). doi:10.1007/s11926-020-00968-7
7. Tuvemo Johnson S, Flink M, Peterson E, et al. Self-management of falls in people with multiple sclerosis: a scoping review. *Clin Rehabil*. 2023;37(2):162–176. doi:10.1177/02692155221128723
8. Katz PP, Yelin EH, Smith S, Blanc PD. Perceived control of asthma: development and validation of a questionnaire. *Am J Respir Crit Care Med*. 1997;155(2):577–582. doi:10.1164/ajrccm.155.2.9032197
9. Mancuso CA, Sayles W, Allegrante JP. Development and testing of the asthma self-management questionnaire. *Ann Allergy Asthma Immunol*. 2009;102(4):294–302. doi:10.1016/S1081-1206(10)60334-1
10. Fuson RL, Sherman M, Van Vleet J, Wendt T. World Medical Association. Declaration of helsinki. *J Bone Joint Surg Am*. 1997;79(7):1089–1098. doi:10.2106/00004623-199707000-00019
11. Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures). *Spine*. 2000;25(24):3186–3191. doi:10.1097/00007632-200012150-00014
12. Mokkink LB, Terwee CB, Patrick DL, et al. The COSMIN checklist manual. *Qual Life Res*. 2012;56:1–56.
13. Acquadro C, Conway K, Wolf B, et al. Development of a standardized classification system for the translation of Patient-Reported Outcome (PRO) measures brief measure of psychological well-being. *Patient Reported Outcomes*. 2008;39(5):–7.
14. World Health Organization. ICD-11 for Mortality and Morbidity Statistics. *Versão*. 2019.
15. Lynn MR. Determination and quantification of content validity. *Nurs Res*. 1986;35(6):382–385. doi:10.1097/00006199-198611000-00017
16. Alexandre NMC, Coluci MZO. Validade de conteúdo nos processos de construção e adaptação de instrumentos de medida. *Ciênc Saúde Colet*. 2011;16(7):3061–3068. doi:10.1590/S1413-81232011000800006
17. Yusoff MSB. ABC of content validation and content validity index calculation. *EducMedi J*. 2019;11(2):49–54. doi:10.21315/eimj2019.11.2.6
18. Juniper EF, Guyatt GH, Willan A, Griffith LE. Determining a minimal important change in a disease-specific quality of life questionnaire. *J Clin Epidemiol*. 1994;47(1):81–87. doi:10.1016/0895-4356(94)90036-1
19. Coker TR, Mitchell SJ, Sj L, et al. Text2Breathe: text-message intervention for parent communication and pediatric asthma. *Acad pediatr*. 2023;23(1):123–129. doi:10.1016/j.acap.2022.05.004
20. Nguyen VN, Huynh TTH, Chavannes NH. Knowledge on self-management and levels of asthma control among adult patients in Ho Chi Minh City, Vietnam. *Int J Gen Med*. 2018;11(81):–89. doi:10.2147/IJGM.S157050
21. World Health Organization. Process of translation and adaptation of instruments. *Geneva*. 2016.
22. Saleem SS, Khan A, Aman R, et al. Impact of pharmacist-led educational intervention on knowledge of self-management among asthmatic patients: a prospective cohort study. *BMJ Open*. 2022;12(6):e058861. doi:10.1136/bmjopen-2021-058861
23. Elbur A, Alharthi B. Self-management and control of asthma among adult patients in King Faisal medical complex Taif. *KSA*. 2017.
24. Mancuso CA, Choi TN, Westermann H, Wenderoth S, Wells MT, Charlson ME. Improvement in asthma quality of life in patients enrolled in a prospective study to increase lifestyle physical activity. *J Asthma*. 2013;50(1):103–107. doi:10.3109/02770903.2012.743150

25. Borges MC, Ferraz E, Pontes SMR, et al. Development and validation of an asthma knowledge questionnaire for use in Brazil. *J Bras Pneumol*. 2010;36(1):8–13. doi:10.1590/S1806-37132010000100004
26. Madhushani HPD. Knowledge attitudes and practices of asthma-Does it associate with demographic factors of adult patients. 2016;3(94):–99.
27. Radeos MS, Leak LV, Lugo BP, et al. Risk factors for lack of asthma self-management knowledge among ED patients not on inhaled steroids. *Am J Emerg Med*. 2001;19(4):253–259. doi:10.1053/ajem.2001.21712
28. Mancuso CA, Sayles W, Allegrante JP. Knowledge, attitude, and self-efficacy in asthma self-management and quality of life. *J Asthma*. 2010;47 (8):883–888. doi:10.3109/02770903.2010.492540
29. Brasil. *Resolução n° 466, de 12 de Dezembro de 2012. Dispõe sobre diretrizes e normas regulamentadoras de pesquisas envolvendo seres humanos*. Conselho Nacional de Saúde.
30. Brasil. *Resolução n° 510, de 07 de Abril de 2016. Dispõe sobre as normas aplicáveis a pesquisas em Ciências Humanas e Sociais*. Conselho Nacional de Saúde.