

ORIGINAL RESEARCH

Cross-cultural adaptation to Brazilian Portuguese of the Activity Measure for Post-Acute Care (AM-PAC) short forms for outpatients in rehabilitation



Mariana Angélica Peixoto De Souza^a, Marisa Cotta Mancini^{a,b},
Wendy Jane Coster^c, Renata Noce Kirkwood^a, Elyonara Mello De Figueiredo^{a,d},
Rosana Ferreira Sampaio^{a,d,*}

^a Graduate Program in Rehabilitation Science, Universidade Federal de Minas Gerais (UFMG), Belo Horizonte, MG, Brazil

^b Occupation Therapy Department, Universidade Federal de Minas Gerais (UFMG), Belo Horizonte, MG, Brazil

^c Graduate Program in Rehabilitation Science, Department of Occupational Therapy, Boston University, Boston, USA

^d Physical Therapy Department, Universidade Federal de Minas Gerais (UFMG), Belo Horizonte, MG, Brazil

Received 4 March 2017; accepted 22 June 2017

Available online 12 July 2017

KEYWORDS

Instrument;
Functioning;
Translation;
Cultural adaptation;
Assessment;
Rehabilitation

Abstract

Background: The Activity Measure for Post-Acute Care was developed to evaluate the limitations of activities of adult individuals with different health conditions.

Objectives: To translate and cultural adapt the Activity Measure for Post-Acute Care short forms for outpatients into Portuguese–Brazilian, to verify the comprehension of the items and categories of the responses by users of the rehabilitation services and to analyze the reliability indices of the instrument.

Methods: Translation and back-translation were conducted by two independent teams. Cognitive interviews ($n=2$) evaluated the comprehension of the translated version among patients. Item reliability and consistency was also investigated.

Results: There was conceptual equivalence between the translated and original versions. For some items, the information was modified in order to attend to the measurement units used in Brazil. Comparative analyses of the translated versions chose the most appropriate term to capture the English content. The few discrepancies identified in the back-translation were solved by consensus. The cognitive interviews detected few comprehension problems, which were solved by means of repetition of the item statement and use of examples to clarify the specificity of the information. The final translated short forms of the instrument showed excellent test-retest reliability and inter-examiner reliability indices, as well as high internal consistency.

* Corresponding author at: Physical Therapy Department, School of Physical Education, Physical Therapy and Occupational Therapy, Universidade Federal de Minas Gerais, Antonio Carlos Avenue, 6627, Campus Universitário, Pampulha, CEP: 31270-401, Belo Horizonte, MG, Brazil.

E-mail: rosana.sampaio@pq.cnpq.br (R.F. Sampaio).

Conclusion: The Portuguese version of the Activity Measure for Post-Acute Care short forms will provide Brazilian clinicians and researchers with an up-to-date instrument for the evaluation of functioning of adults with various clinical conditions who attend outpatient rehabilitation settings.

© 2017 Associação Brasileira de Pesquisa e Pós-Graduação em Fisioterapia. Published by Elsevier Editora Ltda. All rights reserved.

Introduction

The use of functional approaches by rehabilitation team requires instruments to evaluate different components of human functioning. After the publication of the International Classification of Functioning, Disability and Health (ICF),¹ there has been growing effort toward the development of standardized functional tools to be used in rehabilitation. Most of these instruments were developed in foreign countries and their use in other cultures requires a careful process of translation and adaptation.²⁻⁵ The cross-cultural adaptation of questionnaires is a challenging process, requiring skills and experience in order to successfully generate a conceptually-appropriate version of the original instrument with adequate psychometric properties.^{6,7}

The Activity Measure for Post-Acute Care (AM-PAC) was developed to assess functioning of adults with different health conditions in rehabilitation services that offer post-acute care, from hospital discharge up to community integration.⁸ The AM-PAC is grounded on the ICF model, focusing on the activity component and developed according to innovative measurement theory and method: Item Response Theory (IRT) and Computerized Adaptive Testing (CAT).

The IRT creates models to estimate the probability of individuals being successful in one item according to their ability. It compares individuals within a functional dimension despite answering different questions.⁹ The CAT presents to individuals the most appropriate questions to their abilities, allowing an individualized evaluation to the level of proficiency of each examinee. Thus, with a smaller number of items applied, the CAT obtains accurate information about the individual's position in a continuum of a particular ability.¹⁰

The complete version of the AM-PAC is an IRT-Based test that utilizes CAT to present the items to the individual. It includes three domains: "Basic Mobility", with 131 items that inform about basic movements and functional mobility activities; "Daily Activity", which includes 88 items addressing basic self-care and instrumental activities of daily living; and "Applied Cognition", with 50 items that evaluate cognitive activities considered necessary for an independent life.¹¹ The individual or a close acquaintance such as a family member or caregiver is asked to respond on the degree of difficulty or amount of help needed to carry out the activities, using an ordinal scale.^{8,11}

Administration of the original AM-PAC uses the CAT methodology and thus requires a computer with specific software. The AM-PAC generates a score for each domain – the higher the score, the better the individual's functioning.

The user's manual¹¹ provides a classification for interpretation of the final score of each domain, with ranges based on functional stages.

In addition to the original electronic CAT format, two short forms were developed, one for inpatient care and one for rehabilitation in community services, i.e. outpatients. AM-PAC short forms were created through careful selection of subsets of questions from the banks of calibrated items of the domains Basic Mobility and Daily activities and Applied Cognition.^{12,13} By relying in the item's standardized scores it was possible to compare the complexity of the short forms and CAT versions.⁸ Contrasting with the original version, in the short forms the items are in a fixed format on paper, and require that the respondent answer all questions.

Although CAT format has advantages over fixed-point instruments, reliance on a computer with specific software could make it unfeasible for short-term use in services with limited resources, such as the public rehabilitation services in Brazil. Therefore, it was initially decided to translate the short forms of the instrument.

The purpose of the present study was to describe the process of translation to Brazilian-Portuguese and cultural adaptation of the AM-PAC short form for outpatient care, and to verify if the items and response categories of the translated version were adequately understood by patients from rehabilitation services. In addition, we also evaluated the instrument's reliability.

Methods

Description of the AM-PAC – outpatient short form

The short form for outpatient care, translated in this study, has 18 items of Basic Mobility domain; 15 items of Daily Activity; and 19 items from the domain of Applied Cognition.

The short forms require that individuals (or proxy informants) answer questions about their difficulty to perform the activity described in the item (i.e., "How much difficulty do you currently have..."), based on an ordinal 4-point scale (Unable, A Lot, A Little, None). For the final score, the raw score must be obtained from the sum of the values of the response categories for difficulty, that is: unable = 1, a lot = 2, a little = 3, none = 4. In order to compare scores across domains, it is necessary to convert raw scores into standardized scores, using a specific conversion table for each domain, available in the short forms user's manual.⁸ The interpretations are provided for the final score of each domain, with ranges of functional stages.

Translation and cultural adaptation

The translation and cultural adaptation process of the AM-PAC short form started with a contact made with the Boston University group responsible for the instrument. This contact resulted in permission granted to start translating the instrument following the *Guidelines for translation and cross-cultural adaptation of the AM-PAC*.¹⁴ The guidelines listed the steps foreseen in the process of translation and cultural adaptation, as presented in Fig. 1.

In the first phase, both the conceptual equivalence of the AM-PAC short forms and the item equivalence were evaluated. The conceptual equivalence was carried out by a team of translators by means of reading the instrument and its manual, followed by an in-group discussion focusing on the overall AM-PAC concept of "function" – there was no in-depth discussion about the items – to guarantee that all members of the translation team agreed to the concept adopted by the AM-PAC, and it could be understood as having the same meaning in the Brazilian context.

To evaluate the item equivalence, seven rehabilitation professionals, apart from the translation team or conceptual equivalence team, were invited. They were rehabilitation professionals working in public rehabilitation services, or at the university, and did not contact any other members to discuss the items. They evaluated each item individually, and their observations were consolidated, discussed, and considered during the translation.

The second phase consisted of the translation and cultural adaptation of the instrument. Two teams with three translators each conducted the translation.¹⁵ The teams included physical therapists and occupational therapists that were fluent in English and Brazilian-Portuguese and were familiar with the ICF terminology. Among the translators, four of them had lived in English-spoken countries, one is an English teacher, and one lives in Canada. The two teams worked independently, and the members of one team could not communicate with the members of the other. Once the independent translated versions (T1 and T2) were completed, the teams met with the experts committee (which included the project and the translation coordinators) to compare the versions and reconcile the differences, resulting in a translated and common pilot version (T12).

Third step consisted of the T12 back-translation that was performed by two independent translators who were fluent in both languages and were familiar with the ICF terminology. The back-translated versions (B1 and B2) were also compared and reconciled into a common back-translated version (B12). The B12 was submitted to the evaluation of one of the authors of the AM-PAC.

Assessment of the translated and adapted version

Following the approval of the B12, cognitive interviews were conducted to verify whether the translated items and response categories were comprehensible by potential respondents of the instrument, as recommended by the *Guidelines*.¹⁴

The technique of the cognitive interview consists of administering the items from the questionnaire while collecting additional verbal information regarding the response

to the items. Such information can be used to evaluate the quality of the response given by the respondent or to determine if the item is providing information according to the author's original purpose.¹⁵

Cognitive interviews were conducted with two patients from rehabilitation outpatient services, as proposed by Coster & Mancini, since the guidelines do not specify the number of interviews.¹⁵ The interviews were conducted at the most convenient time and place for each participant. Each interview lasted approximately 1 h and 30 min.

Different approaches can be used for cognitive interviews.^{16–18} In this study, the following strategies were adopted to verify the participant's comprehension of the items and the response scale: (1) verbalization of the line of thought when understanding and responding to the item; (2) explanation or exemplification of key terms present in the statement of the item; and (3) recording and quantifying the assistance provided to participant to help his/her understanding of item or response scale, during the interview.

In order to stimulate the participant's line of thought, the interviewer used commands such as: "Please tell me what were your thoughts to answer this question" or "Please give me examples of similar situations that have already happened to you." For some specific terms, explanations or examples were requested by the respondents. The following assistances provided by the interviewer to the respondent were recorded in a field diary: repeating the response options (RR), repeating the item statement (RI), and assistance with examples (EX).

Test-retest reliability, inter-examiner reliability, and internal consistency for the three domains of the translated version were evaluated. These measurement properties are strongly suggested by the COSMIN initiative.¹⁹ The instrument was administered to 30 individuals by two independent examiners. The test-retest reliability assess the consistency between the responses given by the individual on different occasions, and was evaluated twice by the same examiner, for the same individuals, with seven days interval between the assessments. The inter-rater reliability assessed the consistency of the responses given by the same individual when two examiners applied the instrument. The internal consistency was evaluated through the Cronbach's alpha (values above 0.70 were considered acceptable).²⁰

Reliability analyses were conducted using Intra-class Correlation Coefficients (ICC) with 95% confidence intervals. Values of ICC > 0.75 were considered as good reliability, ICC < 0.75 as moderate, and ICC < 0.40 as poor.²¹ The Statistical Package for Social Sciences software version 19.0 was used for the statistical analysis.

This study was a sub-project of a larger research project, approved by the Research Ethics Committee of Universidade Federal de Minas Gerais (UFMG), Belo Horizonte, MG, Brazil in 2013 (No. 414.133). All participants signed the consent form.

Results

Translation and cultural adaptation

In the analysis of the conceptual equivalence, it was found that the concept of "functionality" adopted by

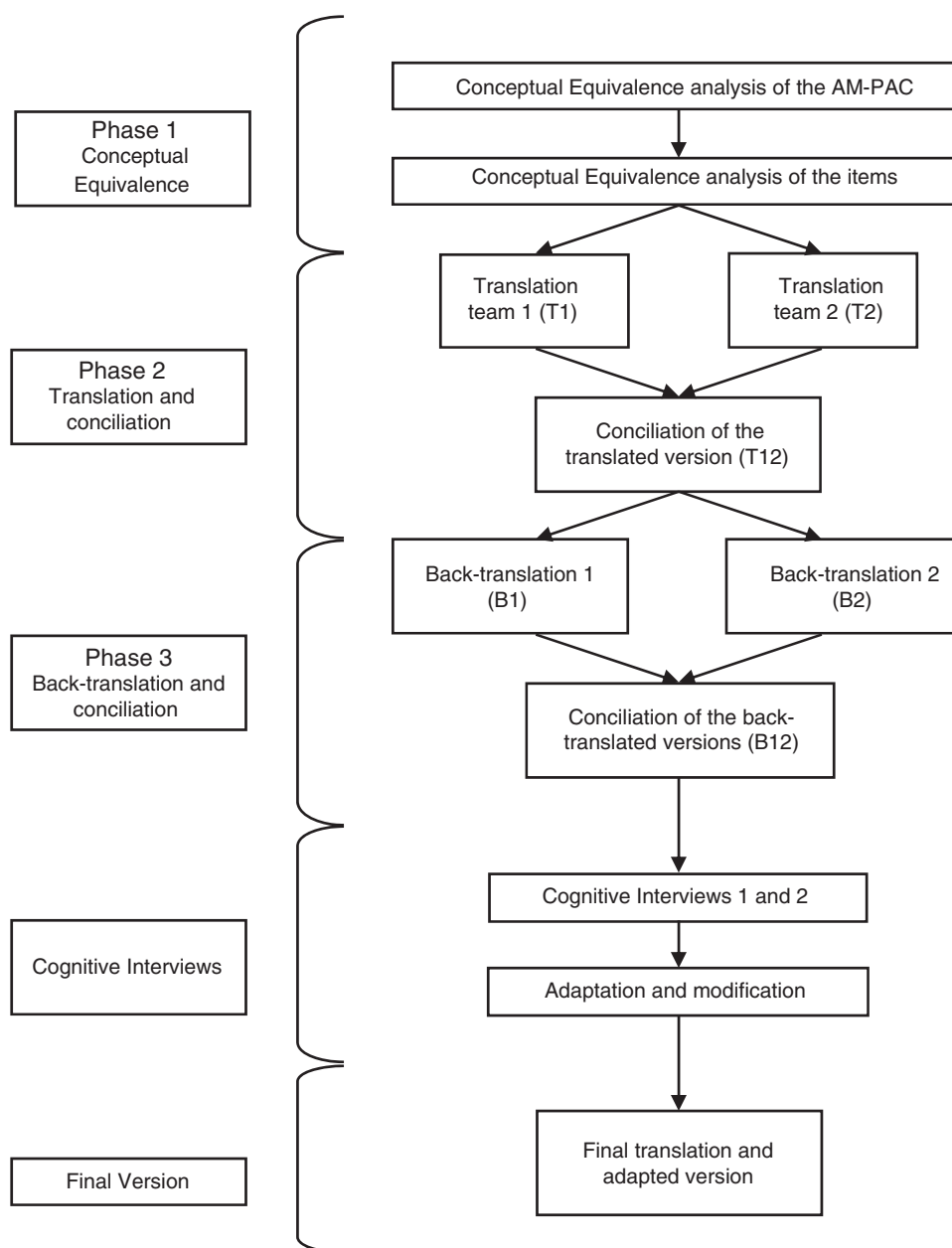


Figure 1 Phases of the translation and cultural adaptation of the AM-PAC – short version for outpatients in rehabilitation. Belo Horizonte, 2016.

the AM-PAC was understood by the team of professionals responsible for the translation and back-translation, and the instrument was considered adequate for translation into Portuguese-Brazilian.

Regarding the analysis of item equivalence, the professionals suggestions referred to the adequacy of the items to reflect the measurement units used in Brazil (i.e. to substitute “pounds” for “kilograms” and “miles” for “kilometers”). One other suggestion included changing the term “mop” to “squeegee”, most commonly used in Brazil. These suggestions were considered during the translation.

During the conciliation meeting, some divergences in the translation of the items were observed and resolved. The

observed divergences and the proposed solutions are shown in [Table 1](#).

The discussion in-group identified specific terms that needed further understanding, which was obtained in the cognitive interviews. For example, in the Daily Activity domain, item 8: “Hanging wash on a line at eye level or above?”, and item 14: “Doing 5 push-ups without stopping?”; and in the Applied Cognition domain, item 13: “Looking up a phone number or address in the phone book or in your own address book?”, the terms “at eye level”, “push-ups”, and “phone book”, respectively, were highlighted for a better understanding of its meaning during the interviews.

Table 1 Divergences observed during the reconciliation meeting of the translated versions (T1 and T2) and proposed solutions. Belo Horizonte, 2016.

Domain	Original item	Divergences	Proposed solutions	Wording of the item in the translated pilot version (T12)
Basic mobility	3. Taking a 1-mile briskwalk, without stopping to rest?	- Necessary to convert unit of measures.	- Conversion of the unit of measurement was carried out and the following expression was used: "por cerca de".	3. Caminhar rapidamente por cerca de 1.5 km, sem parar para descansar.
	6. Walking up and down steep unpaved inclines (e.g., steep gravel drive way)?	- Different translations proposed for the word "steep": superfície inclinada, rampa, rua íngreme, inclinação.	- The word "inclinação" was used.	6. Subir e descer uma inclinação não asfaltada (por exemplo, um caminho íngreme de cascalho)?
	11. Taking part in strenuous activities (e.g., running 3 miles, swimming half mile, etc.)?	- Different translations proposed for the word "strenuous": extremas ou intensas. - Necessary to convert unit of measures.	- The two words that would be verified in the cognitive interviews were kept. ^a - Conversion of the unit of measurement was carried out and the following expressions were used "aproximadamente", "cerca de".	11. Participar de atividades intensas (ou extremas) (por exemplo, correr aproximadamente 5 km, nadar cerca de 1 km, etc.)?
	14. Walking around one floor of their home, taking into consideration thresholds, doors, furniture, and a variety of floor coverings?	- Discussion about the expression: "one floor".	- Withdrawal of the expression, "considerando a característica da maioria das residências brasileiras."	14. Andar pela casa, considerando os desníveis do chão, os móveis e os diferentes tipos de pisos?
	17. Getting into and out of a car/taxi (sedan)?	- Discussion about the example of car sedan.	- Withdrawal of the example about the type of car, to facilitate the comprehension of the responders.	17. Entrar e sair de um carro/táxi?
Daily activity	2. Sewing on a button?	- Different translations proposed for the expression "sewing um botão": costurar um botão ou pregar um botão.	- The expression "pregar um botão" was used since it is commonly used in Portuguese-Brazilian.	2. Pregar um botão?
	3. Pounding a nail in straight with a hammer to hang a picture?	- Discussion about the expression "in straight".	- The expression was excluded to facilitate the comprehension of the responders	3. Bater um prego, usando um martelo, para pendurar um quadro?
Applied cognition	17. Remembering a list of 4 or 5 errands without writing it down?	- Discussion about the expression "errands".	- The word "pessoais" was added to the expression to facilitate comprehension of the item.	17. Lembrar-se de uma lista de 4 ou 5 tarefas pessoais sem a necessidade de anotar?

^a In the cognitive interviews, the two terms were comprehended by the participants. However, the term "extremas" was considered the best to represent the difficulty of the activities mentioned in the item and was maintained in the final translated version.

In the back-translation phase, the few divergences observed referred to the semantics of the terms chosen; that is, the meaning that a given word or expression would present in different contexts. These divergences were

solved through discussion among the translation team and the expert committee, and the terms in the back-translation whose meaning most closely approximated the meaning in Portuguese-Brazilian language were chosen.

In the final evaluation of the back-translated version (B12) by one of the authors of the AM-PAC, a clarification for item 13 of the Applied Cognition domain "Search for a phone number or address in the phone book or in your agenda" was requested. In the discussion with the author, a second back-translation option for the item was presented. The presentation of this alternative version was sufficient to clarify the problem and the B12 was approved.

Assessment of the translated and adapted version

The two interviewed participants were females, active in the job market, had high-school education, and had complaints that could affect their functioning and could be approached by rehabilitation professionals. One participant had low back pain with onset less than three months ago, and the other participant had right shoulder pain and low back pain for about two years.

Table 2 presents the items that demanded the interviewer's help from at least one of the participants, as well as the detail of the identified problem, the proposed resolution, and the final writing of these items.

During the interviews, eight items demanded help to be understood: Items 1, 2, and 13 of Basic Mobility; Items 4, 5, and 6 of Daily Activity; Items 5 and 18 of Applied Cognition. During the analysis of the interviews, it was considered necessary to change the wording of only two of these items – for both, the changes were made by adding examples to facilitate the understanding of the statement of the item (Items 5 and 6 of Daily Activity). In the remaining six items, repeating the statement or the response scale was enough to clarify the item and enable the elaboration of an appropriate response by the respondent. The verbalization of the line of thought to answer the item was used to verify the understanding of the statement in the other items that demanded assistance. However, for these items, the original wording of the statement was kept:

"[Soft and low couch] is that low thing, down below. That you're sinking in it. To get up you need to make an effort."

Participant 2, verbalization after answering Item 2 of Basic Mobility: "Standing up from a low, soft couch?"

"Like, something happened; I have to describe it to see if the person understands."

Participant 2, verbalization after answering Item 5 of Applied Cognition: "Describing something that has happened to you so that others can understand you?"

All the specific terms, pointed out in the conciliation meeting of the translated versions, were adequately understood by the respondents. For example:

"[At eye level] I think that's when it meets eye level."

Participant 2, explanation of the term "at eye level" from Item 8 of Daily Activity: "Hanging wash on a line at eye level or above"

The two cognitive interviews were considered sufficient to verify the comprehension of the items, since few problems were identified and only repeating the statement or adding examples was sufficient to clarify the uncertainties

of the respondents. After all the adjustments, the final version of the AM-PAC short form for outpatients remained with the original number of items, with minor changes related, in most cases, to the units of measurement or removal/addition of examples.

To the analysis of the psychometric properties of the AM-PAC translated version, the instrument was administered to 30 individuals.²² The participants had an average of 47 years (SD = 14), 53% were males and 69% were active in the job market. The mean years of education was 7.8 (SD = 5). Regarding the health condition, low back pain was reported by 20% and impact syndrome by 13%. The translated version of the AM-PAC presented excellent indices for test-retest reliability and inter-examiner reliability, and high internal consistency (Table 3).

Discussion

This study described the translation and cultural adaptation of the AM-PAC short forms for outpatients into Brazilian-Portuguese. Further cognitive interviews verified the comprehension of the translated version among potential respondents of the instrument. Finally, assessment of the measurement properties of the translated instrument added information regarding its potential to produce stable and consistent measurements. In order to carry out this process, the guidelines proposed by the authors of the instrument^{14,15} were rigorously followed. These guidelines required a series of analyses including the conceptual equivalence of "functioning" adopted by the AM-PAC, analysis of item equivalence, translation to Portuguese-Brazilian by two different teams, back-translation, reconciliation of the translated and back-translation versions by team discussion, and cognitive interviews to analyze the comprehension of the translated version. The use of a rigorous methodological strategy for the translation and cultural adaptation of instruments intend to ensure a valid version to be used in a language other than the original.^{2,15,20}

There is consensus that the translation of an instrument already developed in another language has advantages in relation to the construction of a new one: it is faster and results in an equivalent measure that can be used for comparisons in different contexts.^{7,22} Since this process is not simple and involves costs, it is necessary to consider whether the instrument is relevant to research and clinical practice, and if its characteristics are adequate for the purpose, population, and context in which it is intended to be used.¹⁵

In this study, the adjustments were verified in a systematic way during the analysis of conceptual equivalence of the AM-PAC and for each item of the short version for outpatients, concluding with its conceptual adequacy for the Brazilian context and the need for few modifications in the translation of some items (i.e., conversion of units of measurements). Such notes were used during the translation and reconciliation of the translated versions when the team considered the possible problems in the understanding of the items and anticipated strategies to solve these problems.

The strategies used at the time of reconciling the translated version to adequate the items included substitution, addition, or withdrawal of words or expressions; in-depth discussion on the choice of the best term, in view of the

Table 2 Syntheses of the cognitive interviews. Belo Horizonte, 2016.

Domain	Item	Interview		Detail of problems encountered	Proposed solutions	Final wording of the item in the translated version
		1	2			
Basic mobility	1. Curvar-se a partir da posição de pé para pegar uma peça de roupa no chão, sem se apoiarem nada.	RR		One respondent asked to repeat the response options.	Repeating the item was sufficient to solve the interviewee's concern.	Original version kept
	2. Levantar-se de um sofá baixo e macio.		RI	a	b	Original version kept
	13. Andar em uma superfície irregular (ex: grama, Estrada ou caminho de terra, calçada de paralelepípedos, calçadas irregulares)?		RI	a	b	Original version kept
Daily activity	4. Desenroscar a tampa de um pote, que não tinha sido aberto, sem utilizar utensílio doméstico?	RI		a	b	Original version kept
	5. Trocar ou apertar pequenas peças usando apenas as mãos (ex: parafusos)?	RI	RI	In both interviews, it was necessary to emphasize that the item was questioning about changing small pieces using "only" the hands. The interviewees' doubt was due to the single example provided by the item (change a bolt), which usually requires the use of the appropriate tool.	It was verified that there are no additional examples for this item in the original English version of the instrument or in the user manual. The following examples were added: "trocar chip de celular, apertar a tampa da pasta de dentes".	5. Trocar ou apertar pequenas peças, usando apenas as mãos (por exemplo: parafusos, trocar chip de celular, apertar a tampa da pasta de dentes).
	6. Remover embalagens plásticas rígidas utilizando as mãos e tesoura?	RI EX	RI EX	The two interviewees requested to repeat the statement and give examples about "embalagens plásticas rígidas".	It was verified that there are no additional examples for this item in the original English version of the instrument or in the user manual. The following examples were added: "Embalagem de pilhas, de escova de dentes ou de aparelho de barbear."	6. Remover embalagens plásticas rígidas, utilizando as mãos e tesoura (por exemplo, embalagem de pilhas, de escova de dentes ou de aparelho de barbear).
Applied cognition	5. Descrever algo que aconteceu com você de modo que outras pessoas te entendam?	RI	RI	a	b	Original version kept
	18. Cuidar de tarefas complicadas, como administrar uma conta bancária ou providenciar o conserto de equipamentos?	RI		a	b	Original version kept

RR, request to repeat the response options; RI, request to repeat the statement of the item; EX, request to provide examples for the situation mentioned in item.

^a In these items, at least one of the interviewees requested to repeat the statement.

^b In all situations, repeating the statement was sufficient to solve the doubts and allow for the appropriate response to the respective item. In order to keep the item as faithful as possible to the original instrument, it was decided that there would be no to change the original statement.

Table 3 Psychometric properties of the AM-PAC – short forms, translated and adapted to Portuguese–Brazilian ($n = 30$).

	Basic mobility	Daily activity	Applied cognitive
Test-retest reliability (CI = 95%)	0.939 (0.876–0.970)	0.945 (0.889–0.974)	0.88 (0.763–0.941)
Inter-examiner reliability (CI = 95%)	0.998 (0.996–0.999)	0.982 (0.962–0.991)	0.996 (0.992–0.998)
Internal consistency	0.99	0.99	0.99

different possibilities of translation; as well as the selection of terms that should be better investigated during cognitive interviews (Table 1). The use of these strategies considered the importance of adapting the instrument to the sociocultural reality and level of education of the Brazilian population, while at the same time maintaining the original meaning of the AM-PAC.²³

The cognitive interviews were an important step for the initial analysis of the translated version.^{14,15} The use of this technique allows for identifying if the respondents are able to consistently understand the concept and task proposed by the item in the same manner as planned by the original instrument. This process is relevant because if the respondent interprets the item differently from the original version, the conclusions obtained from the responses provided will be inadequate.²⁴

In general, the cognitive interviews displayed a correct understanding of the items and the response scale, evidenced by the approaches used, especially the verbalization of the line of thought when answering the items. In the analysis of these verbalizations, all the items were understood correctly. Although there were requests to repeat the statement of some items, in the verbalization of the final answer it was verified that the participants were able to understand and provide an adequate response to the item. The cognitive interviews indicated the need for adaptation in only two items, besides the changes already made in the previous phase, by the addition of examples to better illustrate the evaluated activity. The changes conducted were minimal and careful thought out, and focused on maintaining the original meaning of the items.¹¹ In addition, we found good results of the reliability and internal consistency for the three domains of the translated version of the AM-PAC. Haley et al.²⁵ found high internal consistency indices for the original version of the AM-PAC (Cronbach's $\alpha = 0.90$ – 0.95).²⁵ These results show that the instrument is reliable and could be used in the evaluation of the activity component in Brazilian adults, with different pathologies and in different rehabilitation services.

The AM-PAC is an up-to-date instrument, both from the point of view of the measurement theory it uses, and also because it was developed based on the ICF. The Brazilian–Portuguese version will permit the evaluation of functioning of individuals who attend rehabilitation programs, as well as the monitoring of those individuals as they change levels of care.

Limitations of the study included the cognitive interviews and the reliability tests were conducted with patients presenting musculoskeletal conditions, although the AM-PAC can be applied in different health conditions. The sample size for the reliability tests is also a limitation ($n = 30$). However, the current project will be followed by future studies that will intend to translate the complete item banks to

enable the use of the AM-PAC CAT version, in addition to the collection of normative data of all the translated versions, including a wider variety of health conditions. It is expected that by providing a consistent, valid, and reliable functional evaluation instrument, theoretically consistent with the ICF model, this project will contribute to the improvement of functional evaluation of individuals in both the research and clinical practice of rehabilitation settings.

Conflicts of interest

The authors declare no conflicts of interest.

Acknowledgments

We would like to thank Dr. Alan Jette for the suggestions provided to the project and for the valuable information and documents shared; the translation team: Daniela Vaz, Fabiana Caetano Silva Dutra, Fabiane Ribeiro Ferreira, Maíra Amaral, Sheyla Rossana Cavalcanti Furtado, Vera Marães; the professionals and professors who participated in the item equivalence analysis: Adriana Silva Drumond, Ana Paula Bensemam Gontijo, Danielle Aparecida Gomes Pereira, Gisele Beatriz de Oliveira Alves, Lúcia Helena de Assis Cabral, Talita Naiara Rossi da Silva; the professional who contributed on the psychometric analysis: Pollyana Rugio Tristão Borges, Jane Fonseca Dias, Bruna Avelar; and the following sources of funding: (1) Ministry of Science, Technology and Innovation (MCTI), Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq), Ministry of Health – REBRATS (n°06/2013); (2) MCTI/CNPq – Universal (n°14/2013); (3) Fundação de Amparo à Pesquisa do Estado de Minas Gerais (FAPEMIG).

References

1. World Health Organization – WHO. International Classification of Functioning, Disability and Health: ICF. 1st ed. Geneva; 2001.
2. Maher CG, Latimer J, Costa LOP. The relevance of cross-cultural adaptation and clinimetrics for physical therapy instruments. *Rev Bras Fisioter.* 2007;11(Aug (4)):245–252.
3. Pereira LM, Dias JM, Mazuquin BF, Castanhas LG, Menacho MO, Cardoso JR. Translation, cross-cultural adaptation and analysis of the psychometric properties of the lower extremity functional scale (LEFS): LEFS-BRAZIL. *Braz J Phys Ther.* 2013;17(May–Jun (3)):272–280.
4. Furtado SRC, Sampaio RF, Vaz DV, Pinho BAS, Nascimento IO, Mancini MC. Brazilian version of the instrument of environmental assessment Craig Hospital Inventory of Environmental Factors (CHIEF): translation, cross-cultural adaptation and reliability. *Braz J Phys Ther.* 2014;18(3):259–267.
5. Lamarão AM, Costa LCM, Comper MLC, Padula RS. Translation, cross-cultural adaptation to Brazilian–Portuguese and

- reliability analysis of the instrument Rapid Entire Body Assessment – REBA. *Braz J Phys Ther.* 2014;18(3):211–217.
6. Acquadro C, Conway K, Hareendran A, Aaronson N. European Regulatory Issues and Quality of Life Assessment (ERIQA) Group. Literature review of methods to translate health-related quality of life questionnaires for use in multinational clinical trials. *Value Health.* 2008;11(May–Jun (3)):509–521.
 7. Epstein J, Santo RM, Guillemin F. A review of guidelines for cross-cultural adaptation of questionnaires could not bring out a consensus. *J Clin Epidemiol.* 2015;68(Apr (4)):435–441.
 8. Jette A, Haley SM, Coster W, Ni PS. *AM-PAC Short Forms for Inpatient and Outpatient Settings: Instruction Manual.* Boston University; 2015.
 9. Haley SM, Coster WJ, Dumas HM, et al. Accuracy and precision of the Pediatric Evaluation of Disability Inventory computer-adaptive tests (PEDI-CAT). *Dev Med Child Neurol.* 2011;53(12):1100–1106.
 10. Jette AM, Haley SM. Contemporary measurement techniques for rehabilitation outcomes assessment. *J Rehabil Med.* 2005;37(6):339–345.
 11. Jette A, Haley SM, Coster W, Ni PS. *Boston University Activity Measure for Post-Acute Care (AM-PAC): User’s Manual.* Boston University; 2009.
 12. Haley SM, Andres PL, Coster WJ, Kosinski M, Ni P, Jette AM. Short-form activity measure for post-acute care. *Arch Phys Med Rehabil.* 2004;85:649–660.
 13. Jette AM, Haley SM, Ni P, Moed R. Adaptive short forms for outpatient rehabilitation outcome assessment. *Am J Phys Med Rehabil.* 2008;87:842–852.
 14. CRE Care. *Guidelines for Translation and Cross-cultural Adaptation of the AM-PAC;* 2015.
 15. Coster WJ, Mancini MC. Recommendations for translation and cross-cultural adaptation of instruments for occupational therapy research and practice. *Rev Ter Ocup Univ São Paulo.* 2015;26(Jan/Abr (1)):50–57.
 16. Beatty P, Willis G. Research synthesis: the practice of cognitive interviewing. *Public Opin Q.* 2007;71(2):287–311.
 17. Willis GB, Demaio T, Harris-Kojetin B. Is the bandwagon headed to the methodological promised land? Evaluating the validity of cognitive interviewing techniques. In: Sirken MG, Herrmann D, Schechter S, Schwarz N, Tanur J, Tourangeau R, eds. *Cognition in Survey Research.* New York: John Wiley; 1999.
 18. Simões S, Pereira MAM. A arte e a ciência de fazer perguntas – Aspectos cognitivos da metodologia de survey e a construção do questionário. In: AGUIAR N, org., Desigualdades sociais, redes de sociabilidade e participação política. Belo Horizonte: Editora UFMG; 2007.
 19. Mokkink LB, Prinsen CA, Bouter LM, Vet HC, Terwee CB. The COnsensus-based Standards for the selection of health Measurement Instruments (COSMIN) and how to select an outcome measurement instrument. *Braz J Phys Ther.* 2016;20(Jan (2)):105–113.
 20. Nunnally JC, Bernstein IH. The assessment of reliability. *Psychom Theory.* 1994;3:248–292.
 21. Portney LG, Watkins MP. *Foundation of Clinical Research: Applications to Practice.* Upper Saddle River: Prentice Hall; 2000.
 22. 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.
 23. Amaral M, Paula RL, Drummond A, Dunn L, Mancini MC. Translation of the Children Helping Out – Responsibilities, Expectations and Supports (CHORES) questionnaire into Brazilian–Portuguese: semantic, idiomatic, conceptual and experiential equivalences and application in normal children and adolescents and in children with cerebral palsy. *Braz J Phys Ther.* 2012;16(Dec (6)):515–522.
 24. Collins D. Pretesting survey instruments: an overview of cognitive methods. *Qual Life Res.* 2003;12:229–238.
 25. Haley SM, Coster WJ, Andres PL, et al. Activity outcome measurement for post-acute care. *Med Care.* 2004;42(1 Suppl):I49–I69.