Cross-cultural adaptation of the Mobile Device Proficiency Questionnaire and content validity for Brazilian Portuguese

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Abstract

Objective: To present the process of cross-cultural adaptation of the Mobile Device Proficiency Questionnaire in the Brazilian older population and its content validity. *Method*: This is a validation study. Translation, back-translation, analysis by an expert committee, and also a pre-test with 32 older adults were conducted to assess semantic and cultural equivalence. Results: The Brazilian version of the instrument maintained the categories of the original version, evaluating tasks ranging from basic to advanced, divided into eight evaluative subscales: basic functions, communication, data and file storage, internet usage, calendar, entertainment, privacy, and problem-solving and software management. Within these domains, the ease of use and experience with mobile device functions are examined. *Conclusion*: The cross-cultural adaptation demonstrated that the evaluative instrument is a useful tool with high potential for assessing the proficiency of older adults in using mobile devices. The instrument enables the establishment of a panorama of digital competencies in the older population, facilitating the planning of digital inclusion services.

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INTRODUCTION

Two major global phenomena occur simultaneously: population aging and technological development[1,2], with a gradual predominance of technological innovations essential for full participation in twenty-first century society.

However, we frequently encounter older adults experiencing obstacles or difficulties that impede or restrict the inclusion of technological devices in their daily lives[3]. These difficulties can arise from biological factors inherent to aging, contextual factors (such as ageism), and challenges stemming from technology itself (such as design or language barriers).

Despite the possibility of encountering difficulties in usage, projections show an increase in the number of older adults accessing the internet in Brazil, which rose from 44.8% to 57.5% between 2019 and 2021, according to data from the National Household Sample Survey (PNAD - Pesquisa Nacional por Amostra de Domicílios). Nevertheless, having access to technological devices and the internet is not synonymous with digital inclusion. For this purpose, it is essential that individuals contemporarily know how to use technological devices, with all their functions, as well as "understand, assimilate, and make use of these resources"[4] in their personal and collective lives.

Using technological resources and being digitally included becomes a means of social qualification and can have a significant impact on the quality of life of older adults, as it can ensure independence in carrying out various activities, whether for accessing or providing services, obtaining information, or as a source of entertainment[2,5-7]. Furthermore, the use of mobile devices has been associated with a reduction in overall cognitive decline and the prevention of depressive symptoms[8].

In this direction, it is essential to understand the skills and difficulties of older adults in using new technologies. Among the evaluative possibilities, the Mobile Device Proficiency Questionnaire (MDPQ) emerges as a useful and valid option for assessing proficiency. Created in 2016 by Roque and Boot, the instrument aims to assess the ability of older adults to perform various basic and advanced tasks on a mobile device. The assessment is divided into eight subscales: (a) basic mobile device skills, (b) communication, (c) data and file storage, (d) internet, (e) calendar, (f) entertainment, (g) privacy, and (h) problem-solving and software management.

Given the utility reported in its original study and the lack of evaluative instruments with the same objective nationally, this research aimed to present the cross-cultural adaptation for the Brazilian context and the content validity of the MDPQ-Brazil.

METHOD

A cross-cultural adaptation and content validation study of the Mobile Device Proficiency Questionnaire[9] instrument was conducted. Initially, authorization was requested to conduct the psychometric study of this instrument from Dr. Walter Boot, from the Department of Psychology at Florida State University, as he is one of the authors involved in the creation of the assessment.

The translation process followed the recommendations of Beaton[9], which included initial translation, back-translation and their respective syntheses, as well as evaluation by the Expert Committee and the pre-test.

The expert committee consisted of five individuals with expertise in the field of gerontechnology who conducted the assessment of semantic, linguistic, language expression, cultural, and conceptual equivalence compared to the original version. Items that achieved more than 75% agreement among the experts were considered equivalent. Therefore, items were modified, excluded, adapted, or retained according to the suggestions proposed by the committee (as presented in the results).

The Mobile Device Proficiency Questionnaire (MDPQ) measures the ability of older adults to perform tasks on mobile devices, grouped into eight subscales: basic concepts, communication, data storage and filing, internet usage, calendar management, entertainment, privacy, troubleshooting, and software management. Scoring is conducted using a five-point Likert scale, where one point is assigned if the older adult has never attempted to perform that operation,

two if they are unable to complete the task, three for tasks they find somewhat difficult to perform, four for tasks they can perform with some ease, or five for operations they can perform very easily. If the older adult has never attempted to perform a task or is unsure of what it entails, they should mark "never attempted", even if they believe they could potentially perform that specific task[10].

The MDPQ instrument comprises a total of 46 questions across eight subscales. Each subscale consists of three to nine questions, depending on the aspects being evaluated. Within each subscale, the arithmetic mean of the responses is calculated. Subsequently, the proficiency score for each older adult is determined by summing the averages of each subscale. Hence, total proficiency scores for mobile devices range from 8 to 40 points. Since the original instrument does not include cutoff points, this study assigned the following parameters for proficiency analysis: scores from 8 to 16 points indicate low proficiency; scores above 16 up to 24 points indicate moderate proficiency; and scores above 24 to 40 points represent high proficiency for mobile devices. However, it is not the objective of this study to present the level of knowledge of each older adult in the use of mobile devices, but rather these scores will serve as parameters for future studies related to the use of this instrument.

During the pre-test phase, the MDPQ-Brazil was administered to 32 older adults to assess their understanding of the instrument in its Brazilian version, investigating potential adjustments. Invitations were extended to individuals aged 60 and above who used mobile devices. In each subscale, older adults were questioned about the ease of comprehension of the questions, whether they had any suggestions for improvements, and if so, what those suggestions were. Furthermore, a sociodemographic questionnaire was administered to characterize the sample in the pre-test phase. The data were stored in a Microsoft Excel® spreadsheet (version 16.80) and subsequently transformed and analyzed in a database using SPSS (Statistical Package for Social Sciences) for Windows, version 21.0. Descriptive statistics were used to characterize the participants and analyze the pre-test, including

measures of central tendency (mean) and dispersion (standard deviation), as well as frequency.

The research was submitted to and approved by the Research Ethics Committee of the Universidade Federal do Paraná under opinion number 4,649,749 dated April 14, 2021. Participation of the expert committee members and older adults was voluntary, and all participants signed an informed consent form. To ensure anonymity, each research participant was assigned a numerical code.

DATA AVAILABILITY

All the dataset supporting the results of this study are available upon request to the author, Taiuani Marquine Raymundo.

RESULTS

The first Brazilian version of the MDPQ was created following the translation and back-translation phases. During the translation phase, three Brazilian professionals with fluency in English and expertise in the field of gerontechnology, specifically in the development and implementation of digital inclusion projects for older adults, participated. The back-translation was conducted by two native English speakers with fluency in Portuguese, who were unaware of the content of the assessment instrument material.

Throughout the translation process, when evaluating all sentences (n=68, including instructions and instrument questions), there was agreement of 26.4% among the translations provided by the three translators, and of these, only 1.47% (2 sentences) required adjustments to fit the questionnaire. Regarding individual results, Translator I provided 11.76% of her translations selected, Translator II contributed 7.35%, and Translator III's percentage stood at 10.29%.

The back-translations of the sentences from the MDPQ questionnaire were conducted by two translators individually, without consultation between them.

After this phase, the results were compiled into a document so that, through consensus, the sentences that were closest to the original questionnaire could be chosen. After synthesis, it was observed that 33.82% (23 sentences) showed agreement between the translations provided by the two translators, and of these, no translation required adjustments to fit. The remaining sentences were chosen in consensus with the researchers of this study.

During the analysis by the expert committee, semantic and cultural equivalence were conducted, and there were some suggestions for changes for the final construction of the instrument. All experts suggested adding the word "móvel" (mobile) after the word "dispositivos" (devices) in all relevant sentences. Following the suggestion of 80% of the experts, in the initial instruction of the MDPQ instrument, the sentence "habilidade para realizar um número de tarefas" (ability to perform a number of tasks) was changed to "conhecimento para realizar um número de tarefas" (knowledge to perform a number of tasks). Additionally, two examples - "telefonecelular" (cell phone) and "tablet" - were added after the phrase "dispositivomóvel" (mobile device).

Furthermore, in the instructions, all experts suggested modifying the phrase "essesdispositivosusam a telasensívelao toque" (these devices use the touchscreen) to "é comandadopelo toque natela" (it's controlled by touching the screen), and they also suggested changing the expression "mesmo que vocêpense que consegueounãorealizá-la" (whether you think you can accomplish it or not) to "mesmo que vocêpense ser capaz de realizá-la" (whether you think you're capable of accomplishing it). Regarding the responses to the instrument's questions, the expression "nãomuitofacilmente" (not very easily) was changed to "com algumadificuldade" (with some difficulty).

In the questions, data regarding adjusting text size were supplemented with examples for better understanding, such as "font/letter". Additionally, less commonly used social media or communication channels in the Brazilian context, such as Google Plus, Google Hangouts, AIM, Yahoo, and MSN, were removed. In their place, WhatsApp, text message, Telegram, Google Meet, Zoom, and WhatsApp video call were included. Regarding local community information searches, the word "recursos" (resources) was replaced by "serviços" (services) and "redefinir o dispositivo para as configurações de fábrica" (reset the device to factory settings) was changed to "restaurar o dispositivomóvel para as configurações de fábrica" (restore the mobile device to factory settings).

For the pre-test, sample characterization was conducted to identify the profile of participants in this phase of the psychometric study (Table 1), using both absolute numbers and the percentage of participants.

Chart 1. Synthesis of translation, back-translation, and definition of the Brazilian version of the MDPQ. Curitiba, PR, 2023.

To access the chart, see the link: https://doi.org/10.6084/m9.figshare.25066499.v1

Source: Authors, 2023

Table 1. Sociodemographic data of pre-test participants. Curitiba, PR, 2023.

Variables	n (%)
Gender	
Female	26 (81.3)
Male	06 (18.7)
Marital Status	
Married	18 (56.2)
Divorced	04 (12.5)
Widowed	08 (25.0)
Single	02 (6.3)
Living with:	
Spouse	10 (31.3)
Spouse, Child(ren)	08 (25.0)
Alone	12 (37.5)
Other	01 (3.1)
Child and Relative	01 (3,1)
Years of Education	
Complete high school	13 (40.6)
Incomplete high school	01 (3.1)
Complete higher education	14 (43.8)
Postgraduate	04 (12.5)

Source: Authors, 2023

The profile of older adults was predominantly comprised of women, with an average age of 72.4 years (±5.4 years), married, and residing either with spouses or alone. The most prevalent level of education was completion of higher education.

Finally, following the application and consolidation of the data, it was possible to identify the knowledge of these older adults in the use of mobile devices. Participants demonstrated greater ease in utilizing the most basic features available on tablets and smartphones, such as turning the device on and off, charging it when the battery is running low, navigating menus using the touchscreen, and using the on-screen keyboard for typing. As functionalities became more complex, participants reported experiencing greater difficulty or never having attempted to execute the function, such as storing file information, saving websites as favorites, entering events and appointments into the calendar, and restoring the mobile device to factory settings (Table 2).

Table 2. Measures of central tendency and variability obtained in the pre-test. (N=32). Curitiba. PR. 2023.

MDPQ- Brazil		Variables				
Subscales	Questions	Mean	Median	Standard Deviation	Q1 Quartile 25	Q3 Quartile 75
Basic Functions of Mobile Devices	Turning on and off the mobile device	4.6	5	±1.08	5	5
	Charging the mobile device when the battery is low.	4.9	5	±0.71	5	5
	Navigating through menus using the touchscreen display	4.1	5	±1.44	4	5
	Using the on-screen keyboard for typing	4.7	5	±0.52	5	5
	Copying and pasting texts using touchscreen input	3.9	4	±1.24	3	5
	Adjusting the volume of the mobile device	4.7	5	±0.58	5	5
	Adjusting the screen brightness	4.5	5	±1.08	4	5
	Adjusting the text size (font/letter)	3.8	4	±1.30	3	5
	Connecting to a Wi-Fi network	4.4	5	±0.94	4	5
Subscale average:		4.4				
	Questions	Mean	Median	Standard Deviation	Q1	Q3
Communication	Opening emails	4.6	5	±0.88	4	5
	Sending emails	4.3	5	±0.94	4	5
	Sending the same email to multiple people simultaneously	3.3	4	±1.65	1	5
	Storing email addresses in an agenda or contact list	2.8	3	±1.55	1	4
	Viewing images sent via email	3.9	4	±1.13	3	5
	Sending images via email	3.3	4	±1.65	1	5
	Posting messages on social media platforms (e.g., Facebook, Twitter, Instagram)	3.4	4	±1.46	3	5
	Using instant messaging applications (e.g., WhatsApp, Messenger, text message, Telegram)	4.3	5	±1.05	4	5
	Making video calls (e.g., Skype, FaceTime, Google Meet, Zoom, WhatsApp video call)	4.1	4	±0.96	4	5
Subscale average:		3.8				
	Questions	Mean	Median	Standard Deviation	Q1	Q3
Data and File Storage.	Transferring files (e.g., music, images, documents) from my mobile device to my computer	2.3	2	±1.47	1	4
	Transferring files (e.g., music, images, documents) from my computer to my mobile device	2.4	2	±1.52	1	4
	Storing information in a way that allows me to access my files from anywhere - cloud (e.g., Google Drive, Microsoft OneDrive, Dropbox)	2.3	2	±1.40	1	3
Subscale average:		2.4				

Continuation of Table 2

MDPQ- Brazil		Variables				
	Questions	Mean	Median	Standard Deviation	Q1	Q3
Internet	Using search engines (e.g., Google, Bing)	3.8	4	±1.28	3	5
	Searching for information on local community services on the internet	3.6	4	±1.43	3	5
	Searching for information on my hobbies and interests on the internet	3.7	4	±1.49	3	5
	Searching for health-related information on the internet	4.3	4	±0.92	4	5
	Reading news online	4.4	5	±0.72	4	5
	Shopping online	3.0	3	±1.50	2	4
	Bookmarking websites to find them again (saving as favorites)	2.8	4	±1.60	1	4
	Saving texts and images I find on the internet	3.3	4	±1.41	3	4
Subscale average:		3.6				
	Questions	Mean	Median	Standard Deviation	Q1	Q3
Calendar	Inserting events and appointments into the calendar	2.3	1	±1.49	1	4
	Checking the date and time of past and future appointments	2.1	1	±1.38	1	3
	Setting up alerts to remind me of events and appointments	2.5	3	±1.57	1	4
Subscale average:		2.3				
	Questions	Mean	Median	Standard Deviation	Q1	Q3
Entertainment	Using the online "store" of the mobile device to find games and other forms of entertainment (e.g.; using the Apple App Store or Google Play Store)	3.1	4	±1.61	1	4
	Watching movies and videos	4.2	4	±1.08	4	5
	Listening to music	3.4	4	±1.54	3	5
	Reading a book	2.7	3	±1.71	1	4
	Taking photos and recording videos	4.2	4	±0.97	4	5
Subscale average:		3.5				
	Questions	Mean	Median	Standard Deviation	Q1	Q3
Privacy	Setting up a password to lock/unlock the mobile device	3.4	4	±1.56	2	5
	Deleting images and videos stored on the mobile device	4.2	4	±0.99	4	5
	Erasing all browsing history and temporary files	3.2	4	±1.64	1	5
	Restoring the mobile device to factory settings. wiping all account information	1.8	1	±1.30	1	3
Subscale average:		3.1				

to be continued

Continuation of Table 2

MDPQ- Brazil		Variables				
	Questions	Mean	Median	Standard Deviation	Q1	Q3
Troubleshooting and Software Management	Restarting the mobile device when it is frozen or not functioning properly	3.5	4	±1.41	3	5
	Updating games and other applications	2.9	4	±1.63	1	4
	Closing games and other applications	3.4	4	±1.58	3	5
	Deleting games and other applications	3.4	4	±1.62	2	5
	Updating the operating system of the device	2.7	3	±1.60	1	4
Subscale average:		3.1				

Source: Authors. 2023.

It is still possible to observe that the means of the subscales ranged from 2.2 to 4.4, as expected, since the lowest proficiency was in the subscale of more complex functions to be performed (such as data and file storage).

DISCUSSION

The cross-cultural adaptation study of the MDPQ created a version for the Brazilian scenario capable of assessing older adults' knowledge of numerous functions of mobile devices, from the simplest to the most complex. This statement is based on the maintenance of the subscales and the minor modifications indicated for the instrument when compared to the original version. Both the expert committee and older adults evaluated the instrument's questions as relevant and easy to understand. Therefore, it seems that this assessment could be a powerful tool to be adopted in research and services aimed at digital inclusion for older adults.

It is known that the proliferation of mobile devices, including smartphones and tablets, increases older adults' access to information and communication technologies. The presence of the internet brings numerous advantages to people's lives, both professionally and in terms of social and cultural relationships. With the constant advancement of technology and widespread computerization, it becomes increasingly necessary for people of different age groups to acquire skills to access and make use of technological devices[11,12].

In this sense, it is worth emphasizing that there are various obstacles that hinder the learning process of these technologies by older adults, which makes it essential to identify the barriers faced by this population, since autonomous use of mobile devices requires a continuous learning process[3,11]. The study by Machado et al.[13] corroborates with the aforementioned, adding that difficulty in using mobile devices can increase social distance and impact the aging process.

Furthermore, independent use of digital technologies enables access to various opportunities, such as new forms of communication, access to online information, online shopping, and banking operations, as well as access to public services, which are increasingly migrating to the digital environment. Additionally, tools for accessing culture, such as virtual museums, watching movies, and listening to music, contribute to reducing social differences, becoming an important factor for social inclusion in contemporary society[14,11].

The findings of this study are aligned with the discoveries of Vechiato and Vidotti[15] and are also upheld in the publication by Nogueira (2022), which emphasize the importance of simple and clear language in technological resources, with ease of interaction, considering human diversity. Moreover,

it is essential for devices to provide instructions to enable older adults to master the systems and use them as facilitators in their daily lives[15,12].

Therefore, in the landscape of this digital society, information inclusion represents an important agenda for public policy for social inclusion[16]. In this direction, digital inclusion projects play a crucial role in facilitating access and empowering older adults to use digital technologies[17].

According to Santos and Almêda[17], the number of educational initiatives aimed at contributing to activities directed towards empowering older adults to use digital technologies is increasing. However, it is important to emphasize that these programs should pay attention to the specific aspects of the age group in order to promote a learning environment tailored to the older adult audience[4,16]. Digital inclusion projects represent a powerful resource to enable older adults to "age anew, learning to overcome the fear of the new regarding the digital context, as well as allowing them to envision the possibilities of learning in the face of their desire to acquire knowledge"[17].

Thus, it is crucial that there are instruments to measure the proficiency of older adults regarding the use of technological devices, as this allows for the establishment of a standard for evaluation. Consequently, assessment enables a more concrete understanding of users' main difficulties, assisting inclusion and digital teaching projects[18], making the practice more productive and effective[10].

The limitations of the study arise from the scarcity of literature on this topic in Brazilian literature. Only one translation and adaptation of the Mobile Device Proficiency Questionnaire[11] were found, conducted by Moret-Tatay et al.[2](2019) for the Spanish language. Furthermore, it was observed in this study that older adults with a high level of education were recruited, as most participants were engaged in activities developed at the university conducting the research. Therefore, in the validation studies of other psychometric properties, it is recommended to recruit a more diverse range of individuals who are representative of the Brazilian olderpopulation. However, this research proves to be important not only for investigating the utilization of technologies

by older adults but also for expanding the possibility of assessing the applicability of this instrument in the national scenario. As future studies, it is recommended to investigate other psychometric properties of this assessment instrument in the Brazilian context.

CONCLUSION

The development of the cross-cultural adaptation of the Mobile Proficiency Questionnaire (MDPQ Brazil) enabled the adaptation of the instrument to assess the proficiency of older adults in using mobile devices in Brazil. It is a useful tool with high potential for assessing knowledge, as well as for assisting in the development and implementation of training on the use of such devices. There is no other material with the same objective in the Brazilian scenario, which could contribute to the knowledge base in the field of gerontechnology.

AUTHORSHIP

- Taiuani Marquine Raymundo - study conceptualization; responsible for all aspects of the work, ensuring accuracy and integrity of all parts of the study; conception and design; drafting the article or critically revising it; approval of the final version to be published.

- Marina Soares Bernardes Facioli - responsible for all aspects of the work, ensuring accuracy and integrity of all parts of the study; conception and design; drafting the paper or critically revising it; approval of the final version to be published.

- Tainá Maria Silva Deodoro - data analysis and interpretation; drafting the paper or critically revising it; approval of the final version to be published.

- Amanda dos Santos Balduino - data analysis and interpretation; drafting the paper or critically revising it; approval of the final version to be published.

- Walter Boot - Creator of the adapted instrument in this study; cooperation throughout the

translation process; approval of the final version to be published.

- Lilian Dias Bernardo - responsible for all aspects of the work, ensuring accuracy and integrity of

all parts of the study; conception and design; drafting the paper or critically revising it; approval of the final version to be published.

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