Cross-cultural adaptation and reproducibility of the *Measure of the Quality of the Environment* in individuals with hemiparesis

Adaptação transcultural e reprodutibilidade do *Measure of the Quality of the Enviroment* em indivíduos com hemiparesia

ORIGINAL ARTICLE

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ABSTRACT: Functionality is influenced by aspects related to a given health condition, as well as by environmental factors. Amongst the questionnaires, that measure the impact of environmental factors on functionality, the *Measure of the Quality of the Environment* (MQE) is commonly used. The aim of this study was to cross-culturally adapt the MQE into the Brazilian-Portuguese language and to assess its reproducibility. Following the cross-cultural adaptation process, the MQE was applied to 28 stroke survivors on two occasions, seven to 10 days apart. Weighted Kappa and intra-class correlation coefficients (ICCs) were calculated to assess test-retest reliability, whereas the limits of agreement were verified by the Bland-Altman plots. The standard error of the measurement (SEM) and the ability to detect real changes (smallest real difference- SRD) were also calculated. The results indicated that 81% of the items showed moderate to almost perfect reliability (ICC>0.71). Systematic errors were not observed between the test and re-test scores and the SEM values were acceptable, being possible to detect real change on perceptions of environmental factors over time. The MQE-Brazil has potential to be used within clinical and research contexts.

KEYWORDS: Stroke; Surveys and questionnaires; Environment; Reproducibility of results.

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RESUMO: A funcionalidade sofre a influência de aspectos relacionados à condição de saúde, bem como de fatores ambientais. Dentre os questionários que mensuram o impacto de fatores ambientais na funcionalidade, o *Measure of the Quality of the Environment* (MQE) é comumente utilizado. O objetivo deste estudo foi adaptar transculturalmente o MQE para o português-Brasil e avaliar sua reprodutibilidade. Após adaptação transcultural, o MQE foi aplicado em 28 indivíduos pós-AVE, duas vezes, com intervalo de sete a 10 dias. Foram calculados os coeficientes Kappa ponderado e de correlação intraclasse (CCI) para avaliação da confiabilidade teste-reteste. Os limites de concordância foram verificados por meio do gráfico Bland-Altman. Foram também calculados o erro padrão de medida (EPM) e a diferença mínima detectável (DMD). Os resultados mostraram que 81% dos itens apresentaram confiabilidade moderada a quase perfeita, e que os escores totais de facilitador e barreira apresentaram alta confiabilidade (ICC>0,71). Não foram observados erros sistemáticos entre o teste e o reteste e os valores EPM foram aceitáveis, sendo possível detectar mudança real da percepção dos fatores ambientais ao longo do tempo. O MQE-Brasil apresentou potencial para utilização na prática clínica e em pesquisas científicas.

DESCRITORES: Acidente vascular cerebral; Inquéritos e questionários; Meio ambiente; Reprodutibilidade dos testes.

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INTRODUCTION

According to the International Classification of Functioning, Disability and Health (ICF), environmental factors constitute the physical, social and attitudinal environment in which people live and conduct their lives[1]. The ICF provides a comprehensive list of these factors, which include: products and technologies; natural environment and changes made by men; support and relationships; attitudes; and services, systems and policies[1]. These factors are external to the individual and interact with the components of the Structures and Body Functions, Activity and Participation, acting as facilitators or barriers in the functionality process and disability linked to several health conditions[1].

Stroke is a major cause of chronic disability among adults in Brazil[2]. After the stroke, the occurrence of limitations in performing daily activities and restrictions in social participation are common[3]. Knowledge about the influence of environmental factors on the emergence of these negative aspects can guide environments modifications to meet the needs of these individuals, since deficiencies and long-term disabilities are still difficult to recover, despite all the technological advances[4]. It is necessary to use standardized tools to measure the impact of environmental factors, thus allowing for the development of strategies aimed at increasing functionality of individuals with stroke, by reducing barriers and increasing environmental facilitators.

The *Measure of the Quality of the Environment* (MQE) is a questionnaire that measures the individual's perception of the physical and social environment, i.e., if each environmental factor is perceived as a facilitator or a barrier during the performance of daily activities and social roles[5]. The MQE contemplates six domains, which cover the five chapters of the Environmental Factor component of the ICF[5,6]: attitudes and social support, employment and income, government and public services, equality of opportunity and political guidance for the social environment; and physical infrastructure and accessibility and technology of the physical environment. There are long (84 items) and reduced (26 items) versions of the MQE. A previous study, with adults suffering of cerebral palsy, indicated that 85% of the items of the long version of the MQE obtained a reliability around 60%[7]. In this study, we studied the reduced version, which maintains the domains covered in the long version, since the use of abbreviated questionnaires involves less time to apply, to calculate and to interpret the score, which may facilitate its use in clinical practice and research[8].

The MQE was developed in English and French, so it was necessary to cross-culturally adapt it for use in the Brazilian population[9,10]. After this process, the evaluation of the measurement properties is recommended to confirm that the questionnaire is suitable for the intended application[9,10]. A measurement property considered as an essential requirement for all outcome measures is reproducibility, which refers to the degree to which repeated measurements in stable individuals, provide similar results[11]. Thus, the objectives of this study to were carry out the cross-cultural adaptation of the MQE to the Brazilian Portuguese language and the evaluation of its reproducibility (reliability and agreement) in individuals with chronic hemiparesis.

METHOD

This methodological study was developed in two stages: the cross-cultural adaptation and the evaluation of the MQE reproducibility. The development of the Brazilian version of the MQE was authorized by the International Network on the Disability Creation Process (INDCP), holder of the copyright.

Participants

Subjects with hemiparesis were recruited from the general community. Inclusion criteria were: clinical diagnosis of primary or recurrent stroke over six months; aged 20 years or older; hemiparesis, characterized by increased tonus of the elbow flexor muscles and/or the weakness of grip and knee extensors, determined by a difference of more than 10% and 15%, respectively, between the paretic and non paretic sides[12]. We excluded individuals with cognitive deficits assessed by the Mini-Mental State Examination (cut-off scores of 13 for illiterates, 18 for elementary school and 26 for high school)[13]; difficulty in verbal expression; bilateral hemiparesis and other musculoskeletal or incapacitating neurological conditions. According to the suggestion of Hobart et al.[14], a sample of at least 20 participants was required to assess reproducibility.

MQE description

The MQE is a questionnaire applied through interviews, during which individuals are asked to estimate the influence of environmental factors during daily life activities, divided into: facilitators, when environmental factors help in performing daily tasks; barriers when

environmental factors make it difficult to perform daily tasks; or no influence when environmental factors do not affect the performance of daily tasks[5]. To score the influence of each of the 26 environmental factors, we use the Likert seven-point scale, which ranges from -3 (major obstacle) to 3 (major facilitator)[5]. A score of zero indicates that the item is not perceived as a facilitator or as a barrier, thus not influencing functionality[5]. Two continuous final scores are calculated: environmental obstacle, which is the mean of all the negative responses (-1, minor obstacle; -2, medium obstacle; -3 major obstacle) and environmental facilitator, which is the mean of all positive responses (+1, minor facilitator; +2, medium facilitator; +3 major facilitator)[5]. These scores provide information on the magnitude of the barriers and/or facilitators these individuals face when performing activities and participating.

Procedure

Cross-cultural adaptation

According to the recommendations by Beaton et al.[9], the MQE was translated into the Brazilian Portuguese language following a semantic, cultural and conceptual point of view by two bilingual translators, whose first language was Brazilian Portuguese, with different academic backgrounds, one being from the health field (step I). Step II consisted of a synthesis of the translated versions, thus generating a consensus-version. With this version, we moved forward with the back-translation, stage III, performed independently by two independent bilingual translators, whose native language was English, with different academic backgrounds, one of them from the health field. They did not have access to the original questionnaire and were unaware of the study objectives. Step IV corresponded to the analysis by the expert committee, composed by the first author, three physical therapists, one translator and one back-translator. This committee reviewed the clarity, relevance and equivalence between the translated, back-translated and original versions, consolidated these versions and developed the pre-final version. Following the authors' suggestions, comments and examples were addedd to the questionnaire, to increase the possibility of understanding the questions.

To check the understanding of the items (step V), the pre-final version was administered to 10 patients with hemiparesis with a mean age of 59±9 years and time since the onset of the stroke of 8±5 years. During application, added to each item of the MQE a question concerning the interviewee's understanding of it, based on a dichotomous scale (easy or difficult). We observed no questions or terminology conflicts, thus satisfactory and cultural semantic equivalences were determined. The process of cross-cultural adaptation (step VI) was completed, and the questionnaire was named MQE-Brazil (Table 1).

Reproducibility assessment

Initially, participants were informed about the objective and procedures of the study and provided written consent. Then, their demographic and clinical data were collected to characterize the sample. Motor impairment was measured by the Fugl Meyer scale (FMS), which allocates a total of 100 points for normal motor function, with scores below 50 indicating severe motor impairment; between 51-84, a marked motor impairment; between 85 and 95, a moderate motor impairment; while scores between 96 and 99 represent mild motor impairment[15]. The MQE-Brazil was applied twice, with an interval of seven to 10 days, by the same trained examiner, who followed the instructions proposed by the manual[5].

Statistical analysis

Descriptive statistics were used to characterize the sample. For the reproducibility analysis, we evaluated the test-retest reliability and the agreement. For the test-retest reliability analysis, we assessed the reliability of the individual items and the total score. The test-retest reliability of the individual items was investigated by calculating quadratic weighted kappa coefficients, to differentiate the magnitude of the response discrepancies[16]. The interpretation of the weighted Kappa, whose score ranges from 0 (no reliability) to 1.0 (perfect reliability), was performed according to the guidelines proposed by Landis and Koch[17] ($0.00 > \kappa < 0.20$, weak, $0.20 > \kappa < 0.40$, fair, $0.40 > \kappa < 0.60$, moderate, $0.60 > \kappa < 0.80$, good, and $\kappa > 0.80$ almost perfect). The test-retest reliability of the total scores (barrier and facilitator) was determined by analyzing the intraclass correlation coefficient (ICC)[16]. The ICC was calculated from the relationship between the variance between subjects and the total variance, with values ranging from 0 (no reliability) to 1.0 (perfect reliability)[16]. The criteria proposed by Munro[18] were adopted for the interpretation of the degree of reliability: very low: 0 to 0.25, low: 0.26 to 0.49; moderate: 0.50 to 0.69; high: 0.70 to 0.89; very high: 0.90 to 1.00.

Table 1 – Final translated version of the MQE-Brazil

Levando em consideração suas habilidades e limitações pessoais, indique o quanto as situações ou fatores geralmente influenciam sua vida diária	**Obstáculo**			**Sem influência**	**Facilitador**			**Eu não sei**	**Não se aplica**
	Maior	**Médio**	**Menor**		**Menor**	**Médio**	**Maior**		
Item	**-3**	**-2**	**-1**	**0**	**+1**	**+2**	**+3**		
1- Apoio daqueles a sua volta (família, amigos, colegas)									
2- As atitudes/comportamentos daqueles a sua volta (família, amigos, colegas)									
3- A disponibilidade/oferta atual de empregos na sua comunidade									
4- As características do seu ambiente de trabalho (estrutura física do local de trabalho, carga horária)									
5- Sua renda pessoal Obs: renda pessoal inclui salário, pensão, aposentadoria e outros rendimentos									
6- Seguros e outros programas de compensação financeira (plano de saúde, seguro de vida, benefícios sociais)									
7- Lojas e serviços em sua comunidade									
8- Serviços de atendimento domiciliar (saúde, faxina, reabilitação, serviços de entrega à domicílio)									
9- Serviços educacionais (escolas, cursos profissionalizantes, faculdades/ universidades)									
10- O veículo pessoal que você usa									
11- Serviços de transporte público									
12- Rádio e televisão (acesso, qualidade da informação, legenda)									
13- Comunicação eletrônica (telefone, fax, e-mail, internet)									
14- Serviços comunitários e culturais em sua comunidade (organizações culturais, esportivas e religiosas) Obs: inclui cinema, teatro, biblioteca, missa, grupo de autoajuda, etc.									
15- Acesso físico de sua residência									
16- Acesso físico de prédios em sua comunidade que você precisa entrar (banco, correio, prefeitura, posto de saúde)									
17- Acesso de ruas em sua comunidade (ruas, calçadas, meio fio, cruzamentos)									
18- Condições climáticas (frio, calor, chuva, umidade)									
19- Intensidade da luz									
20- Intensidade do barulho ou som									
21- Tempo permitido para executar tarefas (tempo necessário para vestir-se, ir ao trabalho, etc.)									
22- Objetos que você usa (itens de trabalho ou estudo, móveis, decoração, eletrodomésticos, equipamento eletrônico)									
23- Dispositivos de auxílio e adaptações, por exemplo, óculos, bengala e corrimão (disponibilidade, uso, manutenção)									
24- Participação em decisões em sua comunidade (assembleia/reunião pública, eleições)									
25- Procedimentos governamentais e administrativos (documentos e formulários necessários para a solicitação de serviços bancários, renovações de aposentadoria, carteira de motorista e benefícios)									
26- Procedimentos administrativos e regras (regras para fumantes, regras em estacionamentos e normas burocráticas)									

To evaluate the agreement between the test-restest scores, Bland and Altman plots were analysed, as well as the standard error of measurement (SEM) and the minimum detectable difference (MDD). The Bland-Altman plot analyzes the limits of agreement between the two measures (test-retest), with the mean difference between the two measurements (test 2 – test 1) being calculated and the confidence interval of 95% used to determine the magnitude of the agreement and the existence of errors and systematic patterns between the two tests[16].

SEM is an estimate of variability between measures after repeated measurements, calculated by the equation [SEM = SD x √ (1-ICC)], in which SD is the standard deviation found in the first application[11,19]. The MDD value is the change in score that is greater than the measurement error, and is thus an important measure when considering the actual change in performance after repeated measurements of individuals in a test[11,19]. The MDD was calculated using the formula [MDD = 1.96 x SEM √ (2)][11.19]. For the SEM, we calculated the SEM%, which corresponds to the percentage related to the total SEM score, interpreted as follows: very good ≤5%; >5% and ≤10% good; >10% and ≤20% doubtful and >20% negative[20]. Since MDD is based on the SEM, no criteria for its analysis was determined.

All analysis were performed using the *Statistical Package for Social Sciences* (SPSS), version 15.0, and the *VassarStats* site with a 5% significance level.

Ethical aspects

The study was approved by the Ethical Committee of the Universidade Federal de Minas Gerais (CAAE 06609312.0.0000.5149).

RESULTS

Sample characterization

Of the 115 people who attended the first evaluation, only 28 returned for the second administration of the questionnaire. The 28 participants had a mean age of 61 ± 10 years (38-83 years), and 57% of the total sample were men. Among the participants, 57.1% (n = 16) did not complete elementary school; 10.7% (n = 3) completed elementary school; 10.7% (n = 3) completed high school; 10.7% (n = 3) have completed higher education; 7.2% (n = 2) were illiterate and 3.6% (n = 1) had not completed secondary school. The mean disease duration was 5 ± 5 years. Regarding motor impairment, 25.0% (n = 7) had moderate motor impairment; 21.3% (n = 6) mild impairment; 17.9% (n = 5) severe impairment; 17.9% (n = 5) marked impairment and 17.9% (n = 5) showed no change in motor function.

Test-retest reliability

Kappa coefficients are reported in Table 2. Of the 26 items of the MQE-Brazil, five (19%) showed almost perfect reliability (κw 0.83-0.95); eight (31%) had good reliability (κw 0.61 to 0.75); eight (31%) had moderate reliability (κw 0.40 to 0.59); and five (19%) showed fair reliability (κw 0.21 to 0.39).

Table 2 – Kappa coefficient classification of the test-retest reliability analysis of the MQE-Brazil items (n=28)

Reference parameters for the reliability Kappa coefficient	Items
>0.80 (almost perfect)	3, 4, 6, 10, 17
0.60-0.80 (good)	1, 2, 5, 9, 11, 13, 14, 18
0.40-0.60 (moderate)	7, 12, 16, 19, 20, 22, 24, 25
0.20-0.40 (fair)	8, 15, 21, 23, 26

The Bland-Altman agreement plot is shown in Figure 1. For the facilitator score (Figure 1A), we observed a mean difference of 0.06±0.42 (95%CI: -0.76 to 0.89); for the barrier score (Figure 1B), we observed a mean difference of -0.23±0.81 (95%CI: -1.83 to 1.36). In both cases, the mean differences are close to zero, indicating that the scores from the first and second application of the MQE were similar. We did not find a distribution pattern to indicate the occurrence of a systematic error.

As we can see in Figures 1A and 1B, two participants showed higher differences between the two applications of the test, both in the facilitator and the barrier scores. Therefore, the ICC, SEM, SEM% MDD% and MDD were calculated with the inclusion of individuals with (n=28) and without atypical behavior (n=26) (Table 3). The ICCs were high in both situations, for both the facilitator and barier scores. SEM% values were considered good (below 10%) for the facilitator score with the complete sample and without the two individuals with atypical behavior. For the barrier score, SEM% was acceptable only with the exclusion of the two individuals with atypical behavior.

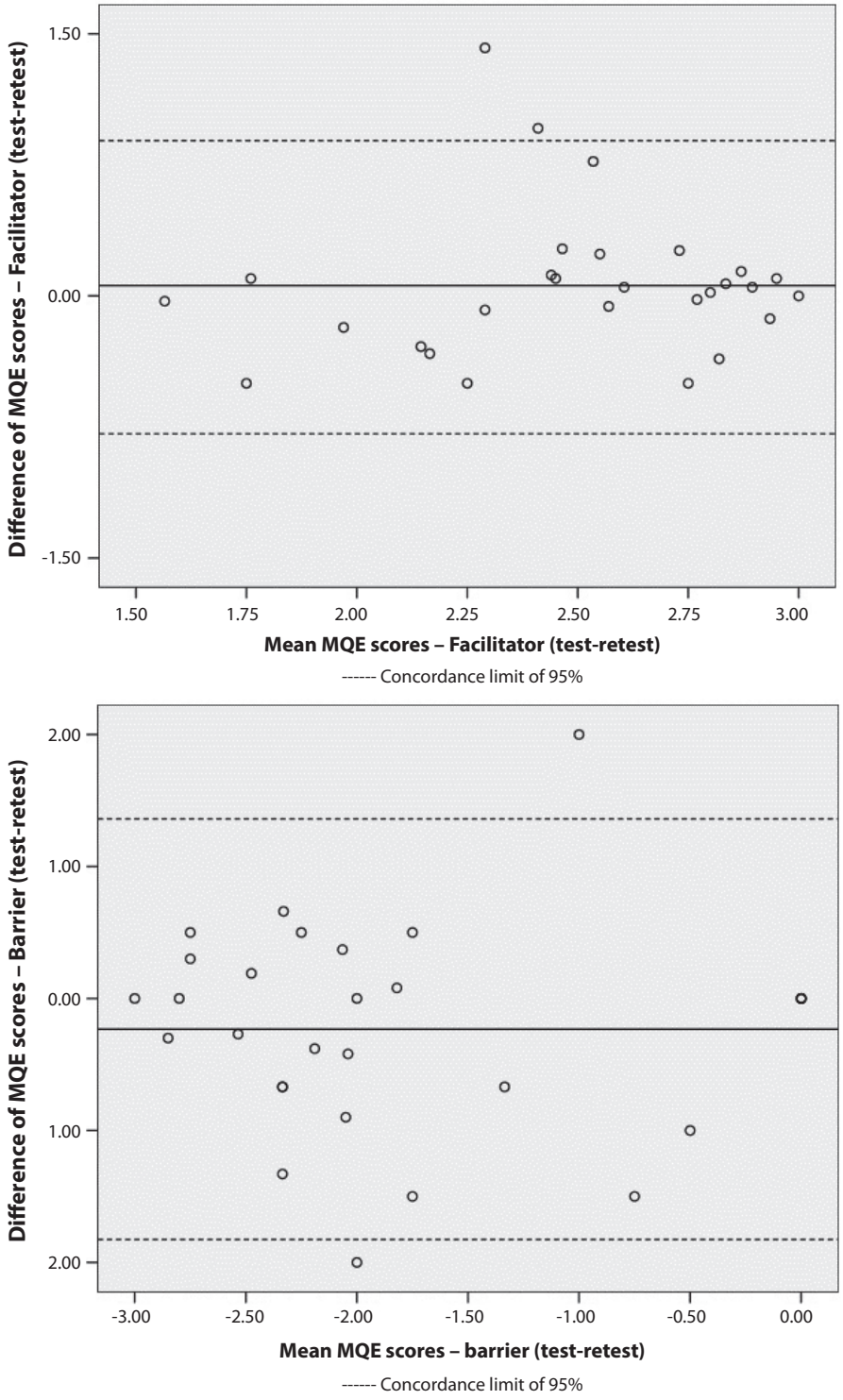

Figure 1 - Bland-Altman agreement plots of the test-retest scores of the MQE – Brazil (n=28). On the horizontal axis (X), we have the mean scores between the test and retest, and on the vertical axis (y), there is the indication of the difference between the first scores (test) and second (retest) application of MQE-Brazil

Table 3 – MQE reproducibility

	n = 28	n = 26
Facilitator		
ICC (95%CI)	0.71 (0.37-0.86)	0.88 (0.73-0.94)
SEM	0.24	0.16
SEM%	8	5
MDD	0.66	0.44
MDD%	22	14
Barrier		
ICC (95%CI)	0.79 (0.55-0.90)	0.88 (0.74-0.95)
SEM	0.43	0.31
SEM%	14	10
MDD	1.19	0.85
MDD%	40	28

ICC = Intraclass Correlation Coefficient; CI = confidence interval; SEM = standard error of measurement; MDD = minimum detectable difference

DISCUSSION

This study performed the cross-cultural adaptation of a questionnaire for the evaluation of environmental factors to Brazil, whose concepts are consistent with the theoretical framework of the ICF. Reproducibility assessment showed that the MQE-Brazil had adequate test-retest reliability and agreement values within acceptable limits. These results indicate the potential for its application in clinical practice and in scientific research, to evaluate the influence of environmental factors on the functionality of individuals with hemiparesis. The first step, the cross-cultural adaptation, followed proposed guidelines[9,10]. Following the suggestion of the authors of the MQE, no items with cultural divergence were modified or excluded. Thus, we only added to the original text comments and examples that increased the possibility of understanding.

Among the methods for test-retest reliability evaluation, we chose the weighted Kappa coefficient since it is a robust method, consistent with the design of this study and appropriate to evaluate questionnaires with categorical variables and results expressed in more than two categories[16]. In the weighted Kappa analysis, 81% of the items had moderate to almost perfect reliability, values superior to those reported by Boschen et al.[7] However, although acceptable, fair coefficient values were found for the items "home care services" (question 8), "physical accessibility of your residence" (question 15), por "the time allowed to carry out tasks" (question 21), "assistive devices – availability and maintenance" (question 23) and "rules and administrative procedures" (question 26). It should be considered that the reliability coefficients are linked to repeated measure stability, thus being vulnerable to the influence of some factors, such as personal factors or regarding the questionnaire itself[11]. Mood changes are among the personal factors that may have affected the stability of the measurements[11]. In addition, the brief description of the MQE items and the relatively low education levels of the sample may have caused difficulties for the participants to consider the influence of environmental factors on the performance of their daily activities[21].

Two individuals in the analysis of the environmental facilitators and barriers showed atypical behavior, with major differences between the scores in the first and second evaluations. When analyzing the full sample (n = 28), we observed no presence of systematic error, i.e., there was no tendency to underestimate or overestimate the environmental facilitators and barriers in the questionnaire reapplication. This can be seen in the Bland-Altman plot, since the points were randomly distributed around zero.

The test-retest reliability analysis of the total scores was performed with and without individuals with atypical behavior. The reliability of the facilitator and barrier scores, analyzed by the ICC, was high in both cases, indicating a consistency of the MQE to assess the impact of environmental factors on functionality. Although the ICC is one of the most common methods for assessing reliability, further analysis should be performed, since the ICC is not enough for a comprehensive assessment of the reproducibility of a measure[16]. The ICC is used to evaluate the consistency between the scores from repeated applications, considering only the variation of the sample[16], thus requested to assess whether the questionnaire can be used for discriminating purposes, if one is making a distinction between individuals[11]. However, to evaluate whether the questionnaire can be used for assessment purposes, or when the objective is to measure the change in the health status of an individual over time, for example, before and after intervention, the detection of individual variation between two tests, examined by using SEM and MDD calculations becomes necessary[11].

The calculation of the SEM, SEM% MDD% and MDD was also performed with and without individuals with atypical behavior. After removing the individual with atypical behavior, we observed that the SEM values (%) were within the limits considered as good (below 10%)[20], indicating that the scores were stable and had low variability. In clinical terms, for any score observed, the SEM quantifies the extent of which a score variation is expected due to measurement error, and this information should be considered in clinical decisions[22]. Thus, after applying the questionnaire to the same individual at different times, a variation of 0.16 and 0.31 for the facilitator scores and barrier, respectively, is related to measurement error and not a real change of environmental factors. For example, for an individual with a score of +2.0 (facilitator), we can expect in a subsequent application, a score ranging from +1.84 to +2.16 (+2.0±0.16) due measurement error. Similarly, if the barrier score is -2.0, we can expect it latter to range between -2.31 and -1.69 (-2.0±0.31). In addition to this SEM interpretation, the MDD can facilitate understanding of the results obtained from the application of the MQE. The found MDD values indicate that changes in the perception of environmental factors over time greater than 0.44 and 0.85 for the scores: facilitator and barrier, respectively, indicate real changes beyond measurement error[22]. The comparison of the reliability index and consistency of response in this study with previous studies is limited, since this was the first study to use the ICC for test-retest reliability analysis and to determine the SEM and the MDD of the MQE.

In this study, data from 28 subjects were analyzed to assess the reproducibility of the MQE. There is no consensus on the size of the sample in reliability studies, although recent publications provide suggestions to assist in the sample calculation[14,23]. This calculation is important because the inadequacy of the sample size may lead to an underestimation of the reliability values and an overestimation of measurement error values[24]. Hobart et al.[14] analyzed the influence of sample size on the stability of the reliability estimates, including test-retest, and the inferences made by these estimates, suggesting that a minimum sample of 20 individuals provides stable estimates in magnitude and interpretation. However, according to recommendations of the *Consensus-based standards for the selection of health measurement instruments* (COSMIN)[23], the minimum sample size to evaluate the reproducibility of a questionnaire should be 30 participants. It is noteworthy that while determining the sample size, one should also consider factors such as financial support and availability of volunteers[25]. In this study, among the 115 volunteers who participated in the first evaluation, only 28 individuals agreed to participate in the second application of the MQE, highlighting the difficulties in carrying out this type of study.

The MQE-Brazil is a questionnaire of fast application (around 20 minutes) and easy interpretation of the scores. However, as occurs with the individual analysis of the items by the Kappa coefficient, some issues showed fair agreement. We suggest that the interviewer reinforces the initial instructions and emphasizes the examples, especially for those items that showed response variability, thus ensuring that the score represents the real perception of the individual under the influence of facilitators and barriers on functionality. It is noteworthy that the results of this study can be generalized to individuals with similar characteristics to those of the sample.

In conclusion, the MQE-Brazil showed adequate reproducibility for use with discriminative and evaluative purposes, with potential to be used in clinical practice and scientific research with individuals with chronic hemiparesis.

Authorship and responsibility statement: I. Faria-Fortini, M. L. Basil F.S.N. Assumpção - contributed to the design, planning, organization and development of the project; they participated in the entire development, from data collection and result interpretation to the preparation of the manuscript, critical review of its content and approval of the final version. L. F. Teixeira-Salmela collaborated with the planning and development of the project and participated in the steps of data tabulation, statistical calculations and result interpretation, preparation of the manuscript and critical review of its content and approval of the final version.

REFERENCES

1. Organização Mundial de Saúde, Organização Panamericana de Saúde. CIF - Classificação Internacional de Funcionalidade, Incapacidade e Saúde. São Paulo: Edusp; 2003.
2. Brasil. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Ações Programáticas Estratégicas. Diretrizes de atenção à reabilitação da pessoa com acidente vascular cerebral. Brasília: Ministério da Saúde; 2013.
3. Meneses KVP, Duarte JS, Alencar VO, Pereira ACS. Perfil sócio demográfico e áreas de desempenho ocupacional afetadas em pacientes pós-AVE atendidos por um serviço de terapia ocupacional. Rev Ter Ocup Univ São Paulo. 2012;23(2):107-12. doi: http://dx.doi.org/10.11606/issn.2238-6149.v23i2p107-112.
4. Langhorne P, Bernhardt J, Kwakkel G. Stroke rehabilitation. Lancet. 2011;377(9778):1693-702. doi: http://dx.doi.org/10.1016/S0140-6736(11)60325-5.
5. Fougeyrollas P, Noreau L, St-Michel G, Boschen K. Measure of the quality of the environment – short version. Québec: International Network of the Disability Creation Process; 2008.
6. Alvarelhão J, Silva A, Martins A, Queirós A, Amaro A, Rocha N, Lains J. Comparing the content of instruments assessing environmental factors using the International Classification of Functioning, Disability and Health. J Rehabil Med. 2012;44:1-6. doi: 10.2340/16501977-0905.
7. Boschen K, Noreau L, Fougeyrollas P. A new instrument to measure the quality of environment for persons with physical disabilities. Arch Phys Med Rehabil. 1998;79(10):1331.
8. Campbell A, Hemsley S. Outcome Rating Scale and Session Rating Scale in psychological practice: clinical utility of ultra-brief measures. Clin Psychol. 2009;13(1):1-9. doi: 10.1080/13284200802676391.
9. Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. Spine. 2000;25(24):3186-91.
10. Costner WJ, Mancini MC. Recomendações para a tradução e adaptação transcultural de instrumentos para a pesquisa e a prática em terapia ocupacional. Rev Ter Ocup Univ São Paulo. 2015;26(1):50-7. doi: http://dx.doi.org/10.11606/issn.2238-6149.v26i1p50-57.
11. De Vet HCW, Terwee CB, Knol DL, Bouter LM. When to use agreement versus reliability measures. J Clin Epidemiol. 2006;59(10):1033-9. doi: 10.1016/j.jclinepi.2005.10.015.
12. Faria-Fortini I, Michaelsen SM, Cassiano JG, Teixeira-Salmela LF. Upper extremity function in stroke subjects: relationships between the International Classification of Functioning, Disability and Health domains. J Hand Ther. 2011;24(3):257-64. doi: 10.1016/j.jht.2011.01.002.
13. Bertolucci PH, Brucki SMD, Campacci SR, Juliano Y. O mini-exame do estado mental em uma população geral: impacto da escolaridade. Arq Neuro-Psiquiatr. 1994;52(1):1-7. doi: http://dx.doi.org/10.1590/S0004-282X1994000100001.
14. Hobart JC, Cano SJ, Warner TT, Thompson AJ. What sample sizes for reliability and validity studies in neurology? J Neurol. 2012;259(12):2681-94. doi: 10.1007/s00415-012-6570-y.
15. Fugl-Meyer AR. Post-stroke hemiplegia assessment of physical properties. Scan J Rehabil Med Suppl. 1980;7(7):85-93.
16. Portney LG, Watkins MP. Foundations of clinical research: applications to practice. 3rd ed. New Jersey: Prentice Hall; 2008.
17. Landis JR, Koch GG. The measurement of observer agreement for categorical data. Biometrics. 1977;33(1):159-74. doi: 10.2307/2529310.
18. Munro BH. Statistical methods for health care research. 5th ed. Philadelphia: Lippincott, Williams & Wilkins; 2005.
19. Pinheiro MB, Scianni AA, Ada L, Faria CD, Teixeira-Salmela LF. Reference values and psychometric properties of the Lower Extremity Motor Coordination Test. Arch Phys Med Rehabil. 2014;95(8):1490-7. doi: 10.1016/j.apmr.2014.03.006.
20. Ostelo RWJG, de Vet HCW, Knol DL, van den Brandt PA. 24-item Roland-Morris Disability Questionnaire was preferred out of six functional status questionnaires for post-lumbar disc surgery. J Clin Epidemiol. 2004;57(3):268-76. doi: 10.1016/j.jclinepi.2003.09.005.
21. Furtado SRC, Sampaio RF, Vaz DV, Pinho BAS, Nascimento IO, Mancini MC. Versão brasileira do instrumento de avaliação ambiental *Craig Hospital Inventory of Environmental Factors* (CHIEF): tradução, adaptação cultural e confiabilidade. Braz J Phys Ther. 2014;18(3):259-67. doi: http://dx.doi.org/10.1590/bjpt-rbf.2014.0036.
22. Overend TJ, Wuori-Fearn JL, Kramer JF, Macdermid JC. Reliability of a patient-rated forearm evaluation questionnaire

for patients with lateral epicondylitis. J Hand Ther. 1999;12(1):31-7. doi: 10.1016/S0894-1130(99)80031-3.

23. Terwee CB, Mokkink LB, Knol DL, Ostelo RWJG, Bouter LM, De Vet HCW. Rating the methodological quality in systematic reviews of studies on measurement properties: a scoring system for the COSMIN checklist. Qual Life Res. 2012;21(4):651-7. doi: 10.1007/s11136-011-9960-1.

24. Hinman RS, Dobson F, Takla A, O'Donnell J, Bennell KL. Which is the most useful patient-reported outcome in femoroacetabular impingement? Test-retest reliability of six questionnaires. Br J Sports Med. 2014;48(6):458-63. doi: 10.1136/bjsports-2012-092072.

25. Schuster C, McCaskey M, Ettlin T. German translation, cross-cultural adaptation and validation of the whiplash disability questionnaire. Health Qual Life Outcomes. 2013;11:45. doi: 10.1186/1477-7525-11-45.

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