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Original Article

Activity Card Sort measurement properties – Brazil: the evaluation of elderly participation in activities[1]

Propriedades de medida do Activity Card Sort – Brasil: a avaliação da participação de idosos em atividades

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Abstract

Introduction: The Activity Card Sort (ACS) is a standardized assessment tool, adapted to Brazilian culture, which evaluates the participation of older adults in instrumental, social, and leisure activities. **Objective:** To evaluate the measurement properties of the Activity Card Sort-Brazil (ACS-Brazil) community-living version (form C). **Method:** Internal consistency and concurrent, convergent and discriminative validity were evaluated. To determine internal consistency, Cronbach's Alpha coefficient was used. Concurrent validity was determined by comparing the ACS-Brazil scores with the LIFE-H 3.1 instrument. Convergent validity was compared with the SF-36 and MMSE-2 assessment instruments, using Spearman's Correlation. The discriminative validity of the ACS-Brazil was assessed using the Mann-Whitney U test, comparing different age groups and years of study. **Results:** Evaluations for analysis of measurement properties were applied to 65 elderly people living in the community. The measure showed excellent internal consistency (α=0.91); strong and positive correlation between the total scores of ACS-Brazil and LIFE-H 3.1 (r=0.442, p < 0.01), and moderate to strong correlation between ACS-Brazil and SF-36, in the domain of physical aspects (r=0.509, p<0.01) and vitality (r=0.518, p<0.01) and pain (r=0.409, p=0.01), except for general health and

[1]This article is the result of research "Translation, adaptation and validation of the Activity Card Sort", developed and coordinated by Professor Dr. Lilian Dias Bernardo, from the Federal Institute of Rio de Janeiro. The research aimed to translate and adapt the Activity Card Sort instrument to the Brazilian context, as well as to validate it through its application in a sample of elderly brazilians. The cross-cultural adaptation process has been previously published in this journal. The research received funding from CNPq and IFRJ.

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emotional aspects. The results also show that the ACS-Brazil is valid for discriminating between age groups and education. **Conclusion:** The ACS-Brazil, community-living version (form C), presented satisfactory psychometric properties, with values consistent with the original version and those from other countries. This indicates its clinical usefulness in application in elderly people to measure participation and engagement in daily activities.

Keywords: Occupational Therapy, Aged, Social Participation, Validation Studies.

Resumo

Introdução: O *Activity Card Sort* é um instrumento padronizado de avaliação, adaptado para a cultura brasileira, que busca mensurar o engajamento e a participação de pessoas idosas em atividades instrumentais, sociais e de lazer. **Objetivo:** Avaliar as propriedades de medida do *Activity Card Sort*-Brasil (ACS-Brasil), versão aplicada aos que vivem na comunidade (forma C). **Método:** Foram avaliadas a consistência interna, a validade concorrente, a convergente e a discriminativa. Para determinar a consistência interna, foi utilizado o coeficiente *Alpha de Cronbach*. Por sua vez, a validade concorrente foi determinada pela comparação dos escores do ACS-Brasil com o instrumento LIFE-H 3.1 e a validade convergente foi comparada com os instrumentos de avaliação SF-36 e MMSE-2, por meio da Correlação de *Spearman*. Já a validade discriminativa do ACS-Brasil foi avaliada pelo teste U de Mann-Whitney, comparando diferentes grupos etários e anos de estudo. **Resultados:** As avaliações para análise das propriedades de medida foram aplicadas em 65 pessoas idosas, residentes na comunidade. A medida apresentou excelente consistência interna (α=0,91); correlação forte e positiva entre os escores totais do ACS-Brasil e do LIFE-H 3.1 (r= 0,442, p <0,01), e moderada a forte do ACS-Brasil com o SF-36, no domínio dos aspectos físicos (r = 0,509, p<0,01) e vitalidade (r= 0,518, p<0,01) e dor (r=0,409, p=0,01), exceto para estado geral de saúde e aspectos emocionais. Os resultados ainda apontam que o ACS-Brasil é válido para discriminar entre grupos etários e escolaridade. **Conclusão:** O ACS-Brasil, versão vivendo na comunidade (forma C), apresentou propriedades psicométricas satisfatórias, com valores consistentes à versão original e de outros países. Isso indica sua utilidade clínica na aplicação em pessoas idosas para mensurar a participação e engajamento em atividades do cotidiano.

Palavras-chave: Terapia Ocupacional, Idoso, Participação Social, Estudos de Validação.

Introduction

In occupational therapy, the interest in understanding the activities that make up a person's occupational repertoire, the transformations that are made possible in this interaction between the individual, the environment and their occupations, and the relationships that are established in this practice are fundamental (Wilcock, 1999; Pfaff & Trentham, 2020), since, through engagement and participation in relevant activities, it is possible to produce, maintain and improve their health and well-being (Engel-Yeger & Rosenblum, 2017; Polatajko et al., 2013).

To identify and understand human occupation, different assessment tools can be used in the occupational therapy process. In the list of highlights, the Activity Card Sort (ACS)

stands out, as it is a tool that postulates health as a product of the interaction between what people do in a given context and that represent or reflect their identity and culture (Baum & Edwards, 2008). It is a client-centered, occupation-based assessment tool (Orellano et al., 2012; Poerbodipoero et al., 2016), developed for the elderly population, which measures participation in instrumental activities of daily living, social activities and leisure (high and low demand) (Baum & Edwards, 2008; Alegre-Muelas et al., 2019).

The integrative review - which analyzed 67 scientific productions on the use of ACS in elderly people - highlighted that this tool is valuable to identify how age, health status, social situation or the perception of quality of life can act as support or restrict participation in activities. The assessment also proved to be a useful outcome measure to identify effects of occupational therapeutic interventions that adopt a client-centered and occupation-based practice, as well as a sensitive instrument to monitor the level of participation and engagement in activities, during the course of the process. (Bernardo et al., 2021).

Complementarily, the integrative review highlighted that the ACS is used in numerous countries and has good psychometric properties (Bernardo et al., 2021). In its original version, this tool showed high levels of internal consistency (α>0.83, in each of the categories) and test-retest reliability within a one-week interval (ICC=0.89), when investigating 20 elderly residents in the community. In the construct validity examination, there was a sample of 60 elderly people with Alzheimer's disease dementia and the level of preserved activity was not significantly correlated with the stages of the disease, showing that the ACS was a valid measure to capture engagement in previous activities (F=0.66, p=0.419) (Baum & Edwards, 2001).

In the analysis of concurrent validity, the ACS, original version, was applied to 244 elderly residents in the community and compared with measures of health-related quality of life (SF-12). Significant correlations were reported with the aspects analyzed by the SF- 12, showing a significant positive association between physical health and engagement in instrumental activities (p=0.006), social activities (p=0.0001) and high-demand leisure activities (p=0.001). Low demand leisure was positively associated with aspects of mental health investigated by the quality of life instrument (p=0.0001) (Baum & Edwards, 2001).

Recently, this evaluation went through the process of translation and cross-cultural adaptation for the Brazilian elderly population. ACS-Brazil presented semantic and conceptual equivalence in relation to the original version (Bernardo et al., 2020). In the cross-cultural adaptation process, the content validity was investigated. Thus, analyzes of other psychometric properties are still necessary to assess the applicability of this instrument in elderly Brazilians. Considering the above, the aim of this study was to evaluate the measurement properties of the Activity Card Sort-Brazil in Brazilian elderly people living in the community.

Methods

This is a methodological study of evidence of internal validity (reliability) and external validity (concurrent, convergent and discriminative validity) of the Activity Card Sort Brazilian version. The research was approved by the Research Ethics Committee, as provided for in Resolution n. 466, of December 12, 2012 (Brasil, 2012), under opinion no. 2,773,267. Participation was voluntary and everyone signed an informed consent form. To ensure anonymity, each person was given a numeric code.

65 elderly people (aged over 60 years) who lived in the community and had the ability to express themselves in writing and/or spoken language participated in the research. Those who had visual impairment uncorrected by assistive products and/or self-report of intellectual disability, and/or any other conditions that would make it impossible to answer the questions from the data collection instruments were excluded.

Participants were initially recruited from existing outreach programs at a public educational institution in the west of Rio de Janeiro and, nearby, from community projects and health programs. Recruitment was done by personal invitation on days when the elderly participated in outreach programs or projects at the educational institution in the West region of Rio de Janeiro and through posters posted in primary health care units, in churches and in the pastoral care for the elderly in the surroundings. Snowball sampling was also adopted, in which participants were encouraged to invite other seniors to take part in the research. Ten elderly people who were not from the municipality participated in these invitations. The instruments were applied from October 2019 to February 2020 and, at the discretion of each participant, data were collected at the educational institution or at the homes of the elderly.

In data collection, the following instruments were applied: sociodemographic questionnaire, Activity Card Sort-Brazil, Mini Mental State Examination – 2nd edition – standard version, Short-Form Health Survey – SF-36 and Assessment of Life Habits – LIFE-H 3.1.

The sociodemographic questionnaire was applied to characterize the sample, containing information on age, gender, marital status, years of education and family composition. In turn, the Activity Card Sort-Brazil was applied to identify the following measurement properties: reliability (internal consistency), convergent, concurrent and discriminative validity.

The ACS-Brazil is an assessment instrument consisting of 83 photographs that depict activities typically performed by elderly Brazilians, divided into four categories: instrumental activities, social activities, low-demand leisure and high-demand leisure. Its original version consists of 89 photographs (Baum & Edwards, 2008), in which eight of these were not considered as representative of Brazilian culture during the cross-cultural adaptation process (Bernardo et al., 2020). Thus, 81 activities from the original ACS were used and, at the suggestion of the expert committee, two instrumental activities commonly performed by the elderly in Brazil were added: medication management and use of public/private transport (Bernardo et al., 2020).

Regarding the investigated categories, the instrument encompasses 21 instrumental activities that represent those that are necessary to maintain and provide goods, such as shopping, going to the doctor or paying bills; 17 social activities that can be done with friends or family, such as spending time with friends, traveling and going to family gatherings; 33 low-demand leisure activities, which represent activities without much physical effort, such as cooking as a hobby, drawing, painting, reading magazines or newspapers; and 12 high-demand leisure activities, that is, those that can promote physical fitness if practiced regularly, such as running, cycling and playing sports.

By observing the photographs, the elderly person reports the current level of engagement in these activities, compared to a previous time (past, before the health condition/illness, before institutionalization), informing if they have never been involved in the activities, if they perform them in the same frequency, if it is a new activity, if they do it in a reduced way or if they gave up on doing it. After this step, the previous level of activities is calculated, which is the sum of the activities that were chosen in the analysis categories: does it now (at the same level); does it less than before and gave up doing it this

past year. The calculation of participation is done by dividing the current activity level and the previous level (Wolf et al., 2012; Baum & Edwards, 2008).

There are three versions of the instrument: the one aimed at elderly people who are institutionalized (institutional version - form A), the one aimed at elderly people who are recovering from some pathological condition and who present changes in activity patterns (recovery version - form B) and the one for elderly people who reside in the community (community-living version – form C) (Laver-Fawcett et al., 2016). In all versions, the same activities are analyzed and only the response variables are changed to suit the context in which the instrument will be applied. In conducting the analysis of the measurement properties, the "community-living" version was used – form C.

To analyze the convergent validity, the other standardized instruments mentioned beforehand were applied. The Mini-Mental State Examination (2nd edition) (MMSE-2), applied in its standard version, is a cognitive screening instrument validated for the Brazilian population that showed good psychometric properties in its correlation with the original version. It assesses eleven categories, represented by registration, temporal orientation, spatial orientation, retrieval, attention and calculation, naming, repetition, comprehension, reading, writing and drawing. The maximum score is 30 points, and the the final interpretation of the score varies according to age and years of education (Spedo et al., 2019).

Next, the SF-36, a gold-standard instrument to measure health-related quality of life was applied. The self-administered questionnaire, validated in Brazil, comprises 36 questions, divided into eight domains: general health, functional capability, physical, social and emotional aspects, vitality, pain and mental health. To answer the questions, the evaluated parties consider their answers based on the last month and, the higher the score, the better the health status (Laguardia et al., 2011).

Finally, for concurrent validity, LIFE-H 3.1 was applied to analyze the social participation of the elderly in daily activities and social roles. The instrument measures performance in 77 questions that identify the ability to perform and the need for assistance for different lifestyle habits. The lower the score, the lesser the restrictions on social participation.

With regard to data analysis, we chose to use methods similar to previous ACS validation studies, such as ACS-Hong Kong, ACS-Australia, ACS-Puerto Rico and ACS-United Kingdom. Descriptive statistics, in addition to central tendency (mean) and dispersion (standard deviation) indices, as well as frequency, were used to characterize the sample.

To determine internal consistency, Cronbach's Alpha coefficient was used. According to Tavakol & Dennick (2011), an α value between 0.7 and 0.9 indicates acceptable internal consistency. Convergent and concurrent validity was determined by comparing the ACS-Brazil scores with LIFE-H 3.1, SF-36 and MMSE-2, using Spearman's Correlation – r. In the analysis of correlations, the parameters of Hulley et al. (2003) for the interpretation of magnitude was considered, in which values $r<0.4$ represented weak magnitude, values between $0.4>r<0.5$ represented moderate magnitude, and values $r>0.5$ represented a strong correlation.

The discriminative validity of the ACS-Brazil was assessed using the Mann-Whitney U test, comparing changes in the occupational repertoire according to length of study (years) and age group (Group 1: 60 to 79 years old; Group 2: over 80 years old). The sample in group 2 consisted of 15 participants, the rest belonging to group 1. All statistical analyzes considered an alpha level of $p<0.05$ and were performed using the Statistical Package for Social Sciences (SPSS), version 20.0.

Results

Of the sixty-five elderly people who participated in the reliability and validation analysis process, most were women, having between nine and twelve years of study, married, living with their spouses and/or spouses and children, as characterized in Table 1.

Table 1. Sample characterization.

Variables	Distribution	
	Mean	**Standard deviation (SD); in years**
Age	69,4	7,2
Years of study	9,96	4,1
	N	**%**
0-4 years	08	12,3
5-8 years	15	23,1
9-12 years	29	44,6
>12 years	13	20,0
Gender	**N**	**%**
Male	23	35,4
Female	42	64,6
Marital state	**N**	**%**
Single	09	13,8
Married	42	64,6
Divorced	06	9,2
Widow/Widower	08	12,3
Family composition	**N**	**%**
Spouse and/or children	41	63,1
Just children/parents	09	13,8
Alone	15	23,1

Source: Authors' elaboration, 2020.

In the analysis of the psychometric properties of the ACS–Brazil, the measure showed excellent internal consistency with the general assessment and its Cronbach's Alpha measures, in the total instrument and in each category, with the data presented in Table 2.

Table 2. Internal consistency of ACS-Brazil.

ACS-Brazil Assessment instrument	Cronbach's α
General evaluation	0,91
Instrumental activities category	0,61
High demand leisure category	0,61
Low demand leisure category	0,84
Social activities category	0,78

Source: Authors' elaboration, 2020.

The analysis of correlations is shown in Table 3.

Table 3. Study of correlations.

Variables	ACS-Brazil	LIFE-H 3.1	MMSE-2	Physical aspects	Functional capability	Emotional aspects	Vitality	Mental health	Social aspects	Pain	General health
ACS-Brazil	1	.442**	.439**	.509**	.399**	.225	.518**	.303*	.248*	.409**	.184
		.000	.000	.000	.001	.072	.000	.014	.047	.001	.142
LIFE- H 3.1		1	.183	.635**	.334**	.229	.447**	.347**	.054	.216*	.248*
			.145	.000	.006	.067	.000	.005	.669	.083	.047
MMSE-2			1	.174	.209	.220	.154	.180	.117	-.157	.014
				.165	.095	.078	.220	.152	.353	.213	.910
Physical aspects				1	.481**	.210	.578**	.378**	.352**	.354**	.255*
					.000	.092	.000	.002	.004	.004	.040
Functional capability					1	.491**	.551**	.361**	.383**	.509**	.159
						.000	.000	.003	.002	.000	.206
Emotional aspects						1	.480**	.430**	.353**	.191	.208
							.000	.000	.004	.127	.096
Vitality							1	.628**	.448**	.551**	.347**
								.000	.000	.000	.005
Mental health								1	.339**	.317**	.244*
									.001	.010	.050
Social aspects									1	.338**	.105
										.006	.404
Pain										1	.079
											.532
General health											1

*The correlation is significant at the 0.05 level (p-value). **The correlation is significant at the 0.01 level (p-value).

In concurrent validity, a moderate and positive correlation was observed between the total scores of the ACS-Brazil and LIFE-H 3.1 (r=0.442, p<0.01). Regarding the convergent validity, positive correlations, from moderate to strong, were found when comparing the scores of the categories that make up the ACS-Brazil with the SF-36 and MMSE-2.

Positive, strong and significant correlations were observed between the ACS-Brazil and SF-36 domains in the domain of physical aspects (r=0.509, p<0.01) and vitality (r=0.518, p<0.01), with moderate correlation for the pain domain (r=0.409, p=0.01). Positive and significant, but weak correlations were also observed in the other domains of the SF-36, except for general health status (r=0.184, p=0.14) and emotional aspects (r=0.225, p=0.07).

In the analysis of discriminative validity, participants in group 2, that is, those over 80 years of age (n=15), had significantly lower scores in all categories of the ACS-Brazil when compared to individuals in group 1, those aged 60-79 years, in which the scores were: total score (z=-3.481, p<0.001), instrumental activities (z=-4.475, p<0.001), low demand leisure (z=-2.953, p=0.003), high demand leisure (z=-2.78, p=0.005) and social activities (z=-3.038, p=0.002).

Significant changes in the occupational repertoire of participants in relation to years of study were observed in the total score of the ACS-Brazil. Participants who reported more years of schooling had better scores in all domains of the ACS-Brazil, showing a strong correlation with the total score of the instrument (r=0.524, p<0.001) and with the domain of social activities (r=0.516, p <0001). A positive and moderate correlation was identified between higher education level and performance of instrumental activities (r=0.409,

p<0.001) and low demand leisure activities (r=0.472, p<0.001), as well as a weak correlation with leisure of high demand (r=0.370, p=0.002).

Discussion

The main findings of this study showed that the ACS-Brazil community-living version - form C showed excelente internal consistency when analyzing the evidence of internal validity, and, in the investigation of evidence of external validity, showed positive correlations from moderate to strong in concurrent and convergent validity, with values equivalent to previous reliability and validity studies of the instrument in different countries.

The measure showed good internal consistency, since all items from the ACS-Brazil and the original version congruently contribute to the participation constructs. When analyzing the ACS areas individually, low demand leisure activities and social activities were more consistent, with an alpha above 0.8 and 0.7, respectively. Studies carried out in Hong Kong (Chan et al., 2006), United States (Baum & Edwards, 2001), Puerto Rico (Orellano et al., 2012) and Israel (Katz et al., 2003) found similar results for analysis of this property.

As an example, Katz et al. (2003) – when analyzing the ACS-Israel in a population of healthy elderly people with neurological or neurodegenerative diseases – reported values of 0.66 and 0.61 for leisure activities of low and high demand, respectively, with greater consistency for instrumental activities (0.82) and social activities (0.80). The original version of the ACS, as mentioned in the introduction and taken up here, was applied to institutionalized elderly people and showed high levels of internal consistency, with values ranging from 0.83 (social activities) to 0.94 (high demand leisure) (Baum & Edwards, 2008). In addition to these data, the study by Chan et al. (2006), carried out in Hong Kong with a group of elderly people post-stroke, in which the internal consistency calculated by Cronbach's alpha was excellent ($\alpha = 0.89$).

Next, discriminative validity was tested to investigate the ability of the ACS-Brazil to distinguish between two groups (different age groups), since it was expected that these would present different levels of participation. The Brazilian version of the instrument proved to be a tool with good validity for monitoring the level of engagement, discriminating the different age groups. Similarly, the study by Doney & Packer (2008), carried out with elderly people living in the community, also showed a higher level of engagement among people aged between 60 and 75 years, compared to those aged 75 years or more. Furthermore, the authors stated strong evidence of the discriminative validity of the ACS-Australia.

In support of this discriminative property, educational level was also shown to be a variable capable of discriminating groups when all items in the ACS-Brazil were analyzed. In this case, those with more years of education correlated with greater engagement in activities. This association was also presented in research conducted by Hamed & Holm (2013).

The measurement properties also showed that the ACS-Brazil, significantly and positively, correlated with indicators of social participation (LIFE-H 3.1), which makes the use of this instrument an integral element in the evaluation process in occupational therapy, as contributes to the understanding of the participation and engagement of elderly people in occupations. Similar outcomes for concurrent validity were found in analyzes carried out in Australia and Jordan (Doney & Packer, 2008; Hamed & Holm, 2013). However, the psychometric study carried out in the Netherlands showed weak to moderate correlations for convergent validity, but the authors suggest caution when interpreting

these results, as the instrument was applied to a heterogeneous sample population and with various methods of application of the ACS (Poerbodipoero et al., 2016).

The ACS-Brazil also showed moderate to excellent validity converging with health-related quality of life (except for the domain related to general health and emotional aspects), which suggests that the level of engagement in activities is positively correlated with welfare. The instrument's correlation with quality of life is also presented in the ACS psychometric studies conducted in Hong Kong (Chan et al., 2006) and Puerto Rico (Orellano et al., 2012).

Overall, the findings of this research suggest that the ACS-Brazil (form C) is a robust and valid tool to detect current participation in activities by elderly Brazilians. In addition to monitoring the level of engagement, participation indicators support the design of occupational therapeutic interventions.

Study Limitations and Future Research

Despite the important findings presented, the limitations of this research cannot be ignored. The study mostly recruited a group of elderly people who resided in an area of a metropolitan city, which may neglect regional cultural differences and limit the generalizability of the results to the Brazilian elderly population. Furthermore, only the "community-living" version (form C) of the ACS-Brazil was applied. The versions: institutional version (form A) and recovery version (form B) were not used, thus, the conclusions of this study may not apply to elderly people residing in long-term care facilities or to those undergoing rehabilitation processes.

Future studies examining the other versions of the ACS-Brazil, in a larger population, in different regions of the national territory, with different health conditions and/or in different environments (hospital, outpatient, closed institutions) are needed to investigate whether the properties of measures are similar to that found in this study and can increase the instrument's usefulness.

This research was also restricted to examining internal consistency, convergent, concurrent and discriminative validity. In a previous study, content validity was examined. However, further studies on other measurement properties are suggested, such as predictive validity analysis or test-retest reliability studies, for example. Psychometric studies are needed to increase the instrument's robustness and to analyze whether the ACS-Brazil is an adequate tool to capture the level of engagement in activities or to measure the results of interventions in the field of occupational gerontological therapy.

Implications for Practice

The ACS-Brazil can be another tool to be used by occupational therapists who care for elderly Brazilians and adopt client-centered and occupation-based practices. This instrument provides valuable information about the occupational repertoire and the level of engagement in activities, with indications of full participation or restrictions. The result of this panorama generates indicators that can serve to correlate the participation of the elderly with age, health conditions, physical and social environment and/or a type of intervention. In addition, in clinical practice, participation indicators favor the elaboration of a singular intervention plan directed to the demands of the elderly, which favors treatment adherence.

As pointed out in the studies by Doney & Packer (2008) and Hamed & Holm (2013), and it is relevant to register, the ACS-Brazil, by using photographs as a resource to capture participation in activities, has the benefit of its applicability in elderly people or people who have communication difficulties, regardless of education, facilitating data collection in the occupational therapist's evaluation process.

Final Considerations

The study with the ACS made it possible to increase the body of knowledge about the psychometric properties of this tool and reinforced the previous evidence regarding the validity of this instrument in capturing the current level of participation in activities.

The survey results indicated high levels of internal consistency, good to excellent results for concurrent, convergent and discriminative validity when compared to other measures of participation, quality of life and age group, respectively. Added to this is the usefulness of this instrument when it is necessary to discriminate participation between different age groups or by level of education.

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