Reliability of assistive technology device – predisposition assessment (ATD PA Br) in Brazilian portuguese

ARTIGO ORIGINAL

Confiabilidade da avaliação de tecnologia assistiva – predisposição ao uso (ATD PA Br) para a versão em português

Ana Cristina de Jesus Alves[1], Emerson Fachin-Martins[2]

http://dx.doi.org/10.11606/issn.2238-6149.v29i2p144-154

Alves ACJ, Fachin-Martins E. Reliability of assistive technology device – predisposition assessment (ATD PA Br) in Brazilian portuguese. Rev Ter Ocup Univ São Paulo. 2018 May-Aug.;29(2):144-54.

ABSTRACT: *Introduction:* The Assistive Technology Device – Predisposition Assessment (ATD PA Br) has been reported as useful to identify the ideal matching between proposed technology and potential user. *Objective:* To investigate the inter-rater and interest reliabilities for each item of the ATD PA Br from a sample composed by Brazilian assistive technology users. Methods: Repeated measures were taken by two independent raters. The same procedures were replicated in the one-week retest day. Spearman correlation test was administered and data were plotted by the Band-Altman method. The range between repeated measures by each item of the application forms was used to calculate the confidence interval, which defined a maximum limit for considering a normal variation between repeated measures. *Results:* Moderate to excellent reliability predominated in the items of the instrument, followed by only 5 items classified as low interrater reliability and 2 items as low intertest reliability. *Conclusion:* The ATD PA Br was proven to be reliable for the Brazilian population, indicating a low interrater reliability weakness to items related to the Professional Version. Thus, we conclude that the ATD PA Br is ready to be used in Brazil.

Keywords: Self care equipment; Outcome and process assessment (Health care); Cross-cultural comparison; Psychometrics.

Alves ACJ, Fachin-Martins E. Confiabilidade da avaliação de tecnologia assistiva - predisposição ao uso (ATD PA Br) para a versão em português. Rev Ter Ocup Univ São Paulo. 2018 maio-ago.;29(2):144-54.

RESUMO: *Introdução*: A Avaliação de Tecnologia Assistiva – Predisposição ao Uso (ATD PA Br) tem como objetivo identificar a ideal combinação entre a tecnologia proposta e o usuário potencial. *Objetivo*: Investigar as confiabilidades interexaminador e teste-reteste de cada item da ATD PA Br para uma amostra de usuários brasileiros de tecnologia assistiva. Método: As medidas repetidas foram tomadas por dois examinadores independentes e os procedimentos foram replicados no reteste. Teste de correlação de Spearman foi aplicado e os dados foram plotados pelo método Bland-Altman. A amplitude da diferença entre medidas repetidas em cada item foi utilizada para cálculo do intervalo de confiança que estabeleceu um limite máximo para se considerar variações normais entre as medidas repetidas. *Resultados*: Confiabilidades moderada a excelente predominaram nos itens do instrumento, acompanhadas por apenas cinco itens classificados como de pouca confiabilidade interexaminador e dois itens de pouca confiabilidade interteste. *Conclusão*: A ATD PA Br mostrou-se confiável para a população brasileira, indicando pequena fragilidade de confiabilidade entre examinadores para itens relacionados ao formulário do profissional. Conclui-se que a ATD PA Br está pronta para uso no Brasil.

Descritores: Equipamentos de autoajuda; Avaliação de processos e resultados (Cuidados de saúde); Comparação transcultural; Psicometria.

1. PhD in Special Education by the Federal University of São Carlos (UFSCar), Adjunct Professor of Occupational Therapy at the University of Brasília (UnB), and Full Professor at the Postgraduate Program in Rehabilitation Sciences (PPGCR).
2. PhD in Psychology in the field of Neuroscience and Behavior by the University of São Paulo (USP), associate professor in the Physiotherapy course of University of Brasília (UnB), and Full Professor at the Postgraduate Programs in Health Sciences and Technology (PPGCTS), Rehabilitation Sciences (PPGCR), and the Professional Master's Program in Intellectual Property and Technology Transfer for the Innovation of the National Network of Professional Masters for Nuclei of Technological Innovation (PROFNIT).

Corresponding address: Ana Cristina de Jesus Alves. University of Brasília, Ceilândia Campus, Occupational Therapy, Centro Metropolitano, Cj. A, lote 1. Brasília, DF, Brazil. CEP: 72220-275. E-mail: crisjalves@hotmail.com

INTRODUCTION

Assistive Technology (AT) has been described as strategies, services and devices that favor the autonomy of individuals with disabilities or reduced functionality[1]. However, the success of the device in favor of autonomy seems to depend on public and social policies and the establishment of a systematized prescription procedure for AT, with continuous monitoring and participation of the user.

Research in Brazil and worldwide has detected that the abandonment of prescribed AT reaches close to 20%[2-7], and shows that among the possible causes are personal factors, such as: failure to accept disability, depression and high expectations; environmental factors such as architectural barriers, lack of social support, professional support and access and training for use; and factors intrinsic to the equipment, such as poor product quality, coupled with device aesthetics.

As observed, the evidence stresses an apparent incompatibility between the proposed technology and the potential user that must be identified prior to its implementation in order to reduce the inappropriate use or abandonment of the device and, thus, eliminate the possibility of disappointment, frustration, and a waste of financial resources[5].

The investigation of this incompatibility was favored by an instrument that identified the predisposition to the use of AT, either before its prescription or during the follow-up and training to use a prescribed AT[8-11]. Among instrumental options to identify parameters of this apparent incompatibility, there is the Assistive Technology Device - Predisposition Assessment (ATD PA) tool is available, available in English and tested for its psychometric properties for English-speaking therapists[9,11].

The ATD PA proposes a script for qualification of items for both prescribing professionals and AT users in order to ensure the success of a prescription based on the ideal combination between user and technology, guiding both the indication of new devices and of additional technologies[12].

Any instrument that generates measures must have its psychometric properties investigated for specific populations, even if their original version has already beenvalidated[5]. The cross-culturally adapted Brazilian version of ATD PA (ATD PA Br)[13] has not yet been tested for its interrater and intertest reliability for Portuguese-speaking countries. Thus, the objective of this study was to investigate the interrater and test-retest reliability of each ATD PA Br item for a sample of Assistive Technology users in Distrito Federal.

METHODOLOGICAL PROCEDURES

This is a longitudinal prospective study that considered repeated measures in time (test and retest) by two different and independent raters (occupational therapists), taking into account the reproducibility of all items that constitute the two parts of the instrument assumed as qualified both by the therapist and by the individual user.

Two occupational therapists participated as independent raters and a convenience sample of 12 AT users were recruited during a forum promoted by the Center for Assistive Technology, Accessibility and Innovation (NTAAI) of the University of Brasilia, where they were invited to discuss the usability of AT from the perception of the wishes of technology prescribers.

The population targeted for sample constitution included people with needs for AT for use in basic daily activities (self-care, food, clothing, communication, mobility, etc.) or instrumental activities of daily living (leisure, study, work, sports, among others) who accepted to participate in the research. Those that were interested in technologies for rehabilitation (therapeutic technologies) were excluded.

Users who agreed to participate signed the Free Consent Form and all ethical procedures were followed, as approved by the Ethics Research Committee from the Federal University of São Carlos, Opinion No. 45/2012. The occupational therapy raters (E1 and E2) had experience in research involving AT, and applied the ATD PA Br in test and retest sessions from October 2015 to January 2016.

The guidelines for applying the instrument, which do not require previous training, were systematically followed and refer to the instructions of each section of the script itself, as advocated by its creators[12]. Doubts arising throughout the applications were clarified between the researchers and the author of the original English version via e-mail.

Repeated measurements were collected through a structured interview (unlike the original version, which is self-applicable), as already proposed in the cross-cultural

adaptation[13], given the cultural characteristics of Brazil, and the sessions for data collection were scheduled in two days (test and retest), with an average interval of one week between each interview.

In the beginning, each participant was individually interviewed to characterize the sample and was then subjected to qualification procedures for the items of ATD PA Br by the two raters, with a 15 minute interval between each rater. All procedures used in the test session were replicated in the retest.

The order of the items was changed with each repetition to avoid memorizing the previously qualified results. As not all items had qualifiers expressed in numerical values, some statistical procedures had to be converted using a sum of items or values analyzed to obtain a value that better expressed them (conversions were authorized by the author of the version).

Sample power was calculated later, since our sampling procedure was by convenience. The sample was characterized according to the frequency of qualitative variables described below with their respective distribution classes: (1) gender (female or male), (2) source of demand for AT (own client or companion), (3) disability type (motor, sensory, intellectual or multiple), and (4) type of AT according to classification from the United States Department of Education[14].

With the exception of variable 4 (a type of AT according to classification), which was calculated considering the total AT in use (some users used more than one AT, resulting in a total of 16 classified devices), the variables were computed based on the total sample (n=12).

The Spearman correlation test was applied to identify the quality of the association between repeated measures in different conditions (interrater – E1-E2 – and intertest – T-RT), which were considered significant at $p<0.05$ with a confidence interval of 95% (95% CI) and qualified by the correlation index (r2), as well as by the Bland-Altman method for analyzing the magnitude of the observed reliability based on the difference and mean between repeated measures for the same 95% CI[15].

For analyses per item was considered the structure of each form (Client, Device and Professional). Only the forms for Client and Professional are organized into sections (A, B and C). In section C of the form for the Client there is no numerical value; thus, it was stipulated to express a value that added positive (C+) or negative (C−) psychosocial factors.

Only section A of the Professional version, rated on a three-level handicap scale, one level of neutrality or three levels of incentive, had its items analyzed by the sum of choices. The remaining items were analyzed by the sum of the qualifiers, ranging from 0 to 7.

In the Device form, a single value expressing the sum of all items was considered, named "Directions", being analyzed along with the items related to the Customer's form.

Values that exceeded the 95% CI limit had the difference between measures repeated by raters (E1-E2) and between test and retest (T-RT) considered for each analysis condition and that were highlighted and included in the reliability of each item, which took into account: (1) if the item exceeded the 95% CI, and (2) if the association calculated by the correlation index (r^2) was significant (p) for the two analysis conditions - conditions in the test or retest for the differences between examiners (E1-E2) and conditions for each examiner in the differences between test and retest (T-RT).

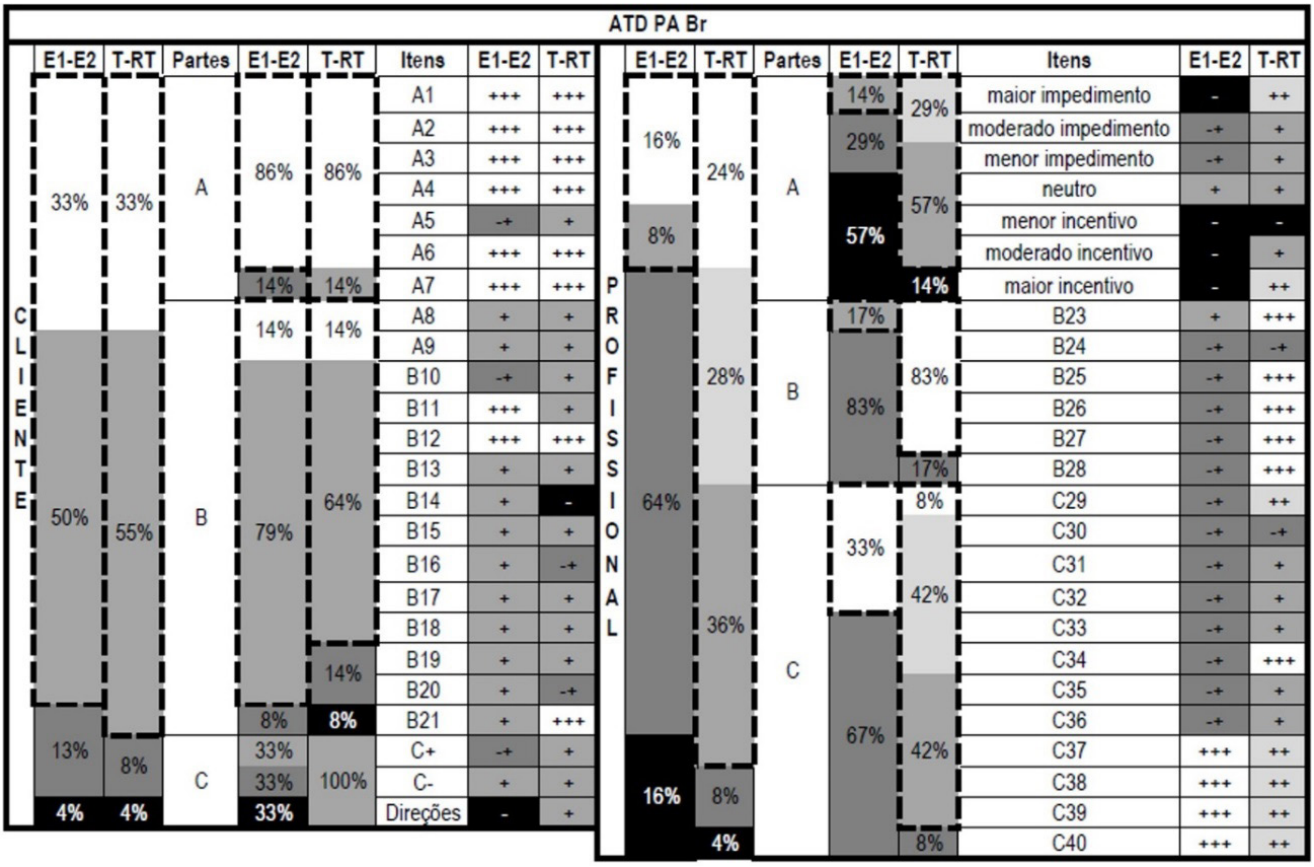
Reliability qualification was then defined in five item classes: (−) no or few, (− +) low, (+) moderate, (++) high, and (+++) excellent reliability.

None or little reliability (−) was the qualification attributed to repeated measures that exceeded the 95% CI in both analysis conditions and did not have significant r^2. Low reliability (− +) was attributed to repeated measures that exceeded the 95% CI or that did not have significant r^2, but which already showed one or two conditions in which the difference between the repeated measures did not exceed the 95% CI limit or manifested association between measures with significant r^2.

Moderate reliability (+) was attributed to items whose repeated measures were within the 95% CI and with significant r^2 in at least one of the two experimental conditions, i.e. at least in the test or retest for difference/association of E1-E2 or at least one of the raters met the considerations for the T-RT difference/association.

High reliability (++) was attributed to items in which the only one of the considerations was not met in one of the experimental conditions. Lastly, excellent reliability (+++) was attributed to the items that met all the considerations for the two experimental conditions.

Finally, to guide the discussion of items, parts, forms, and the entire instrument, we present in Figure 1, which shows the frequency of items qualified by this analysis.



Illustrative figure of the overall analysis of the reliability observed by items and parts, both for measures repeated by the two raters (E1-E2) and for repeated measures between the tests (T-RT), in the versions directed towards the Client (left) and the Professional (right). Each item and proportion of item qualifications were classified in black, white and gray scale as to their reliability in: (–) no or low reliability (black), (– +) low reliability, (+) moderate reliability, (++) high reliability and (+++) excellent reliability (white). The dotted highlighting points to the best reliability of the ATD PA Br in the partial and full versions for Customer and Professional.

Figure 1 – Overall reliability analysis

RESULTS

Throughout the application of ATD PA Br, doubts emerged that were clarified with the author of the original version. Among them, it was necessary to understand that, although the evaluation is focused on the client's own demand, caregivers and/or family members could also be considered clients when demanding the acquisition of AT for the care of the disabled individual.

It was also necessary to organize the items in section C of the Client's form, which refers to psychosocial factors, in order to facilitate the visualization, comprehension and summation of the items by the raters, which was authorized by the author of the original version.

The demand for AT devices collected in this sample was in its majority (67%) demanded by the clients themselves, and 33% of them were requested for assisting the caregiver (Table 1).

Sample power was rated very high and revealed that Spearman's correlation tests showed a power of 92% for n=12, considering a 95% confidence interval and a significance level of 0.05.

Among the deficiencies diagnosed in the sample, 92% were physical, and there was only one participant with sensory impairment (Table 1).

Table 1 – Characterization of sample and use of Assistive Technology (AT)

Qualitative variables	**n**	**%**
Sample	12	100%
Female	5	42%
Male	7	58%
Patient itself	8	67%
Companion	4	33%
Diagnoses	12	100%
Motor impairment	11	92%
Sensory impairment	1	8%
Intellectual Disability	0	0%
Multiple disability	0	0%
Total AT used in the sample by classes[1]	16	100%
Basic activities of daily living	5	31%
Mobility	4	25%
Computers	3	19%
Orthoses and prostheses	2	13%
Architectural elements	1	6%
Adapted furniture	1	6%
Sensory elements	0	0%
Controls	0	0%
Recreation, leisure and sports	0	0%
Services	0	0%

[1]U.S. Department of Education, 2000. Absolute (n) and relative (%) values.

Table 1 also shows that, according to the classification by the United States Department of Education, of the 16 ATs that were being used by the sampling, more than half (56%) were related to products for basic activities of daily living and mobility, with the remaining assistive products being computer assistance devices, orthoses and prostheses and a minority constituted by architectural elements (6%) and adapted furniture (6%).

The analysis of the association between measures repeated by the two examiners both for test and retest in the items of the Client version (Table 2) showed a predominance of significant correlation coefficients (r^2) ($p<0.05$) in the proportion of 28:20 items qualified from moderate (+) to very high (+++) reliability, with difference between repeated measures below the maximum limit of normality obtained at a 95% confidence interval for most items.

In this version directed towards the Customer (Table 2), the retest obtained a better association between measures and an increase in reliability was observed, reducing from 13 to 7 items that indicated non-significant correlations and from 3 to 2 items with an amplitude of difference between examiners higher than the observed normality for all items at a 95% confidence interval.

The same analysis made for the version aimed at the Professional (Table 3) did not show the same proportion of items qualified as reliable. Non-significant ($p>0.05$) correlation coefficients (r^2) were predominant at a 40:10 ratio of qualified items with no or low reliability (−) and low reliability (− +). Differently from what was observed in the Client version, in the one intended for the therapist the reliability pattern of the items did not change with the retest, with only item B23 expressing a significant association (Table 3).

Similarly, analysis of the association between repeated measures in Table 4, which compares the measures between tests for both rater 1 and rater 2 in the items of the Client version, showed a predominance of significant ($p<0.05$) correlation indexes (r^2) at a 29:19 ratio of items rated from moderate (+) to very high (+++) reliability, with difference between repeated measures below normality for a 95% confidence interval for most items.

Table 2 – Association and difference between the measures repeated by the examiners for test and retest (E1-E2) for all items of the version directed towards the Client and the Device in the ATD PA Br

Client		TEST					RETEST				
		E1 *versus* E2		95% CI (E1-E2)			E1 *versus* E2		95% CI (E1-E2)		
		r^2	p-value	from	to	amplitude	r^2	p-value	from	to	amplitude
Part A	(+++) A1	0.936	0.000	−1.671	2.004	1.079	0.925	0.000	−1,093	0.925	2.018
	(+++) A2	1.000	0.000	−0.649	0.482	1.131	1.000	0.000	0.000	0.000	0.000
	(+++) A3	0.994	0.000	−0.649	0.482	1.131	0.776	0.003	−1.937	2.937	4.874
	(+++) A4	0.796	0.002	−1.727	1.227	2.954	0.810	0.001	−1.448	1.448	2.896
	(−+) A5	**0.442**	**0.151**	−2.172	2.506	4.678	**0.509**	**0.091**	−2.631	1.631	4.262
	(+++) A6	0.860	0.000	−1.182	1.182	2.364	0.733	0.007	−2.481	1.981	4.462
	(+++) A7	0.841	0.001	−2.036	1.869	3.905	0.863	0.000	−1.471	1.638	3.109
	(+) A8	0.800	0.002	−1.971	1.138	3.109	**0.501**	**0.097**	−2.076	3.076	5.152
	(+) A9	0.708	0.010	−1.803	1.470	3.273	**0.499**	**0.099**	−3.409	1.909	5.318
Part B	(−+) B10	**0.274**	**0.389**	−4.385	2.052	6.437	**0.289**	**0.363**	−3.983	2.149	6.132
	(+++) B11	0.633	0.027	−2.318	1.818	4.136	0.734	0.007	−1.971	1.138	3.109
	(+++) B12	0.766	0.004	−1.894	0.727	2.621	0.954	0.000	−1.426	0.593	2.019
	(+) B13	**0.310**	**0.327**	−4.284	3.284	7.568	0.662	0.019	−2.199	2.366	4.565
	(+) B14	**−0.184**	**0.567**	−5.345	4.178	**9.523**	**0.297**	**0.348**	−2.772	2.772	5.544
	(+) B15	**0.259**	**0.417**	−5.591	2.091	7.682	0.731	0.007	−2.172	2.506	4.678
	(+) B16	**0.166**	**0.606**	−5.596	1.262	6.858	0.682	0.015	−3.718	2.385	6.103
	(+) B17	**0.262**	**0.411**	−3.286	2.119	5.405	0.906	0.000	−1.394	1.227	2.621
	(+) B18	**0.423**	**0.170**	−3.983	2.149	6.132	0.609	0.036	−2.847	2.014	4.861
	(+) B19	0.844	0.001	−3.154	1.987	5.141	**0.569**	**0.053**	−3.867	2.033	5.900
	(+) B20	**0.537**	**0.072**	−1.470	1.803	3.273	0.701	0.010	−2.454	2.787	5.241
	(+) B21	**0.495**	**0.102**	−3.076	2.076	5.152	0.634	0.027	−2.541	1.707	4.248
Part C	(−+) C+	**0.346**	**0.271**	−4.527	7.694	**12.221**	0.661	0.019	−4.864	6.364	**11.228**
	(+) C−	**0.285**	**0.346**	−1.351	3.018	4.369	0.975	0.000	−1.643	3.643	5.286
(–) **DEVICE**		**−0.092**	**0.767**	−3.807	25.970	**29.777**	**0.559**	**0.059**	−8.439	31.270	**39.709**

Table 3 - Association and difference between the measures repeated by the raters for test and retest (E1-E2) for all items of the version directed towards the Professional in the ATD PA Br

Professional		TEST					RETEST				
		E1 *versus* E2		95% CI (E1-E2)			E1 *versus* E2		95% CI (E1-E2)		
		r^2	p-value	from	to	amplitude	r^2	p-value	from	to	amplitude
Part A	(−) higher impairment	**0.328**	**0.299**	−3.529	7.362	**10.891**	**0.573**	**0.051**	−4.168	6.835	**11.003**
	(− +) moderate impairment	**−0.172**	**0.592**	−1.818	2.318	4.136	**−0.091**	**0.779**	−1.394	1.227	2.621
	(− +) less impairment	**−0.332**	**0.292**	−3.920	3.920	7.840	**0.076**	**0.813**	−3.435	4.102	7.537
	(+) neutral	0.739	0.006	−7.099	2.766	**9.865**	**0.452**	**0.140**	−10.340	4.177	**14.517**
	(−) less incentive	**−0.096**	**0.767**	−6.031	8.197	**14.228**	**0.011**	**0.973**	−5.674	6.007	**11.681**
	(−) moderate incentive	**0.179**	**0.577**	−14.430	1.099	**15.529**	**0.020**	**0.951**	−14.790	3.123	**17.913**
	(−) higher incentive	**0.364**	**0.245**	−6.014	17.510	**23.524**	**0.420**	**0.170**	−1.305	14.970	**16.275**
Part B	(+) B23	**0.452**	**0.140**	−1.869	1.869	3.738	0.610	0.035	−1.947	1.447	3.394
	(− +) B24	**0.368**	**0.239**	−1.468	0.968	2.436	**−0.185**	**0.533**	−1.470	1.803	3.273
	(− +) B25	**−0.020**	**0.950**	−1.207	3.041	4.248	**0.434**	**0.159**	−0.240	2.573	2.813
	(− +) B26	**0.000**	**1.000**	−1.852	2.185	4.037	**−0.431**	**0.162**	−1.707	2.541	4.248
	(− +) B27	**0.503**	**0.096**	−1.671	1.671	3.342	**0.066**	**0.838**	−1.671	2.004	3.675
	(− +) B28	**0.553**	**0.062**	−1.727	1.227	2.954	**0.391**	**0.209**	−1.848	1.681	3.529
Part C	(− +) C29	**0.567**	**0.055**	−2.181	1.348	3.529	**−0.122**	**0.706**	−2.207	2.041	4.248
	(− +) C30	**0.185**	**0.565**	−2.746	2.079	4.825	**0.398**	**0.200**	−1.803	1.470	3.273
	(− +) C31	**0.302**	**0.340**	−3.942	2.275	6.217	**0.274**	**0.389**	−3.538	2.038	5.576
	(− +) C32	**0.256**	**0.421**	−2.887	2.220	5.107	**−0.112**	**0.730**	−3.159	3.492	6.651
	(− +) C33	**−0.399**	**0.199**	−4.375	3.375	7.750	**−0.064**	**0.843**	−2.347	2.514	4.861
	(− +) C34	**−0.264**	**0.401**	−3.020	2.353	5.373	**−0.411**	**0.185**	−2.909	2.409	5.318
	(− +) C35	**−0.244**	**0.445**	−1.789	2.789	4.578	**−0.362**	**0.248**	−2.317	2.651	4.968
	(− +) C36	**0.313**	**0.323**	−1.707	2.541	4.248	**−0.038**	**0.906**	−2.454	2.787	5.241
	(+++) C37	1.000	0.000	−0.596	0.930	1.526	1.000	0.000	−1.789	2.789	4.578
	(+++) C38	1.000	0.000	−0.596	0.930	1.526	1.000	0.000	−1.789	2.789	4.578
	(+++) C39	1.000	0.000	−0.596	0.930	1.526	1.000	0.000	−1.789	2.789	4.578
	(+++) C40	1.000	0.000	−0.596	0.930	1.526	1.000	0.000	−1.789	2.789	4.578

Table 4 – Association and difference between the repeated measures in retest by each rater (T-RT) for all items of the version destined for the Client and Device in the ATD PA B

Client		RATER 1					RATER 2				
		T *versus* RT		95% CI (T-RT)			T *versus* RT		95% CI (T-RT)		
		r^2	p-value	from	to	amplitude	r^2	p-value	from	to	amplitude
Part A	(+++) A1	0.953	0.000	−0.835	0.835	1.670	0.799	0.002	−2.632	2.132	4.764
	(+++) A2	1.000	0.000	−0.649	0.482	1.131	1.000	0.000	0.000	0.000	0.000
	(+++) A3	0.871	0.000	−1.610	0.943	2.553	0.89	0.000	−1.642	2.142	3.784
	(+++) A4	0.867	0.000	−1,093	0.925	2.018	0.971	0.000	−0.596	0.929	1.525
	(+) A5	**0.079**	**0.806**	−2.939	3.606	6.545	0.6	0.039	−2.073	1.406	3.479
	(+++) A6	0.950	0.000	−0.835	0.835	1.670	0.824	0.001	−1.727	1.227	2.954
	(+++) A7	0.905	0.000	−1.447	1.947	3.394	0.728	0.007	−1.707	2.541	4.248
	(+) A8	0.860	0.000	−1.468	0.968	2.436	**0.364**	**0.245**	−2.147	3.480	5.627
	(+) A9	**0.389**	**0.211**	−1.632	3.132	4.764	0.617	0.033	−2.172	2.506	4.678
Part B	(+) B10	**0.106**	**0.744**	−3.981	3.648	**7.629**	0.736	0.006	−1.681	1.848	3.529
	(+) B11	0.786	0.002	−1.638	1.471	3.109	**0.452**	**0.140**	−2.318	1.818	4.136
	(+++) B12	0.830	0.001	−1.240	1.573	2.813	0.72	0.008	−0.943	1.610	2.553
	(+) B13	**0.441**	**0.152**	−3.546	3.546	7.092	0.545	0.067	−2.246	3.412	5.658
	(−) B14	**−0.371**	**0.235**	−5.170	4.836	**10.006**	**0.345**	**0.272**	−2.974	3.807	**6.781**
	(+) B15	**0.090**	**0.782**	−5.576	3.243	**8.819**	0.642	0.024	−0.947	2.447	3.394
	(−+) B16	**0.373**	**0.233**	−4.307	2.474	6.781	**0.334**	**0.288**	−2.807	3.974	**6.781**
	(+) B17	0.715	0.009	−2.036	1.869	3.905	**0.474**	**0.120**	−2.014	2.847	4.861
	(+) B18	0.714	0.009	−2.654	2.487	5.141	**0.371**	**0.235**	−2.286	3.119	5.405
	(+) B19	**0.406**	**0.190**	−3.193	4.527	**7.720**	0.665	0.018	−2.939	3.606	6.545
	(−+) B20	**0.488**	**0.108**	−2.261	4.095	6.356	**0.568**	**0.054**	−1.786	3.619	5.405
	(+++) B21	0.994	0.000	−0.649	0.482	1.131	0.577	0.050	−1.448	1.448	2.896
Part C	(+) C+	0.599	0.040	−3.610	7.110	**10.720**	**0.513**	**0.088**	−5.635	7.469	**13.104**
	(+) C−	**0.174**	**0.657**	−2.917	2.584	5.501	0.785	0.002	−2.643	2.643	5.286
(+) **DEVICE**		**−0.144**	**0.592**	−6.718	11.550	**18.268**	0.664	0.018	−6.020	11.520	**17.540**

In the analysis between the tests of the version intended for the Client (Table 4), rater 2 obtained a better association between measures, observing an increase in reliability, reducing from 11 to 8 the amount of items that indicated non-significant correlations and from 6 to 4 items with amplitude difference between the tests higher than the normality observed for all items at a 95% confidence interval.

However, the same analysis, when applied to the version aimed at the Professional for repeated measures between tests (Table 4), did not present the same ratio of items qualified as reliable. There were predominant correlation indices (r^2) that were non-significant ($p>0.05$) at a 34:16 ratio for items with no or low reliability (−) and items with low reliability (− +). However, in spite of maintaining its pattern, a smaller number of items of low reliability were observed for associations between the tests, especially for rater 2, which, in the Professional version, reduced the number of these items to 4, since rater 1 had obtained associations of low reliability in 6 items. On the other hand, in the repetition of measures obtained by rater 2, more items with an amplitude above normality were observed.

DISCUSSION

This study aimed to investigate the reliability of each item of the ATD PA Br instrument, considering the Client, Device and Professional forms, following with statistical rigor the analysis of the 106 items, something never done in previous studies, even for the original version[5,16,17].

Considering the AT demands of the participants, it can be observed in Table 1 that 56% of the requested devices were related to the basic activities of daily routine (ABVD). This data, as expected, reflected the established inclusion criterion, which defined the need for this type of device, whose indication for ABVD in the country is a private act of occupational therapists, as the raters were[18].

The identification of the use of 16 AT, including products for ABVD and mobility, computer assistance, orthoses and prostheses, products that constitute architectural elements, adapted furniture, observed in Table 1, reinforces that the application of ATD PA Br can collaborate with professionals, clients and family/caregivers in choosing the device, fulfilling the objective proposed by the instrument[12].

Although it was not the focus of this study, this information may corroborate with future studies of predictive validation for the ATD PA, already performed in other countries[5].

It is important to point out that doubts were generated during the first implementation of ATD PA Br, similarly to what occurred during the first implementation in Brazil[19]. Therefore, it was still necessary to request clarifications from the author of the original version.

When considering the statistical analysis of the Customer form, it is highlighted that two items presented low reliability in the test and retest, corresponding respectively to the item physical ability and satisfaction with personal care and domestic activities, as shown in Table 2. Additionally, when looking at Table 2, in particular, the data of the retest application, it is possible to observe a higher number of reliable items, and it is possible to think of a greater familiarity of the examiners with the instrument, both in the Client and Device forms (Directions).

Therefore, given the need for clarification throughout the implementation of the instrument and the increase in reliable items for retest, it would be sensible to think of the need to provide more detailed information on the application of the ATD PA Br, be it by means of a manual or the professionals who apply the instrument.

The Professional form presented, although in a few cases, items with none, little or low reliability even after retest and between raters, as can be seen respectively in Tables 3 and 4. These findings corroborate with the only reliability study found, which presented three cases evaluated by 30 professionals, having low agreement rates between raters, calculated by frequency[16]. The author of the original version argues that this finding can be attributed to the characteristics of the ATD PA, which is designed to investigate subjective and personal factors of the clients, which can compromise the objectivity of the Professional form[16]. The reliability of a test can be affected by factors related to the instrument and the examiner, as already described in other studies[20].

Among the factors related to the instrument that could justify the low reliability, there is the number of items, their degree of difficulty and the homogeneity of the test[20]. In this sense, it may be noted that ATD PA has a high number of items (54 in the Client form, 12 in Device and 40 in Professional) and that both professionals and clients had difficulties in understanding them, aside from the fact the instrument investigates different subjective constructs, such as perception of ability, satisfaction, combination, among others.

On the other hand, the factors related to the rater refer mainly to the motivation, the comprehension of the instructions and the characteristics of the respondent[20], and these could also have influenced the results. These factors may have contributed to the low reliability of some items in the analysis between raters of the ATD PA Br Professional

form in the Brazilian context.

However, it is worth mentioning that the identification of low reliability items can help researchers of the PA ATD to focus on what is lacking, especially regarding items and forms of low reliability, contributing to the elaboration of an improved version of the original instrument.

Under a global analysis, Figure 1 may show that, for both measures repeated by the two examiners (E1-E2) and for repeated measures between tests (T-RT), the Client form had, for the most part, items of moderate and high reliability. On the other hand, the forms Device and Professional presented higher reliability indexes in T-RT and low reliability in the inter-rater analysis.

In this investigation, we presented a detailed reliability analysis per item for the ATD PA instrument for use in Brazil, which allows us to provide a reliable instrument for the indication and evaluation of the use of AT devices. The instrument ATD PA Br and its manual are available, like open access, in the library repository of the University of Brasília[21]. Thus, it is expected that this evaluation and validation studies may offer more subsidies for professionals prescribing AT in Brazil, given the abandonment of assistive products continues to grow in the country[13].

CONCLUSION

The reliability study of the ATD PA Br brought important reflection on the use of the instrument and can contribute to the improvement both for the original and cross-culturally adapted versions. The ATD PA Br is an effective and reliable instrument, but its criteria are still being validated in Brazil by this research group. It can also be concluded that this instrument is able to help professionals prescribe assistive devices along with other TA instruments and/or others that focus on component evaluation, performance and participation.

Acknowledgements: To the author of the original version of the instrument, Marcia J. Scherer, for the attention and availability for clarifying our doubts and the constant encouragement to the research. To the occupational therapists and students of the Occupational Therapy course of the Faculdade de Ceilândia at the University of Brasilia who contributed with the application of the instrument and with data collection (CNPq scholarship holders - Opinion No. 458671/2013-4).

Authorship and Indication of Responsibility: ACJ Alves and EF Martins conceived and outlined the project, analyzed the data, drafted and revised the article, and approved the version to be published.

REFERENCES

1. Brasil. Subsecretaria Nacional de Promoção dos Direitos da Pessoa com Deficiência. Comitê de Ajuda Técnica. Tecnologia assistiva. Brasília: CORDE; 2009. Disponível em: http://www.pessoacomdeficiencia.gov.br/app/sites/default/files/publicacoes/livro-tecnologia-assistiva.pdf.
2. Scherer MJ, Gluckuf R. Assessing the benefits of assistive technologies for activities and participation. Rehabil Psychol. 2005;50(2):132-41. doi: 10.1080/09638280400014816.
3. Scherer MJ, Sax C, Vanbiervliet A, Cushman LA, Scherer JV. Predictors of assistive technology use: the importance of personal and psychosocial factors. Disabil Rehabil. 2005;27(21):1321-31. doi: 10.1080/09638280500164800.
4. Scherer M, Jutai J, Fuhrer M, Demers L, Deruyter F. A framework for modeling the selection of assistive technology. Disabil Rehabil Assist Technol. 2007;2(1):1-8.
5. Scherer MJ, Sax CL. Measures of assistive technology predisposition and use. In: Mpofu E, Oakland T. Rehabilitation and health assessment: applying ICF guidelines. EUA: Springer Publishing Company; 2010.
6. Riemer-Reiss ML, Wacker RR Factors Associated with assistive technology discontinuance among individuals with disabilities. J Rehabil. 2000;66(3):44-50.
7. Cruz DMC, Emmel MLG. Uso e abandono de tecnologia assistiva por pessoas com deficiência física no Brasil. EF Deportes. Rev Digital. 2012;17:1-8.
8. Rocha ANDC, Deliberato D. Tecnologia assistiva para a criança com paralisia cerebral na escola: identificação das necessidades. Rev Bras Educ Especial. 2012;18(1):71-92. doi: 0.1590/S1413-65382012000100006.
9. Alves ACJ, Matsukura TS. Revisão sobre Avaliações para indicação de dispositivos de tecnologia assistiva. Rev Ter Ocup Univ São Paulo. 2014;25(2):199-207. doi: 10.11606/issn.2238-6149.v25i2p199-207.
10. Carvalho KEC, Junior MBG, Sá KN. Tradução e validação do Quebec User evaluation of satisfaction with assistive technology (QUEST 2.0) para o idioma português do Brasil. Rev Bras Reumatol. 2014;54:260-7. doi: 10.1016/j.rbr.2014.04.003.
11. Alves AC, Matsukura TS. Modelos teóricos para indicação e implementação de tecnologia assistiva. Cad Ter Ocup UFSCar (São Carlos). 2016;24(3):591-9. doi: 10.4322/0104-4931.ctoAO1078.
12. Scherer MJ. THE institute for matching person & technology. Improving the match of person and

technology. Nova York: Webster; 2008.

13. Alves ACJ, Matsukura TSM, Scherer MJ. Cross-cultural adaptation of the assistive technology device – predisposition assessment (ATD PA) for the use in Brazil (ATD PA Br). Disabil Rehabil Assist Technol. 2017;12:160-4. doi: 10.1080/17483107.2016.1233294.

14. United States-Department of Labor 2010 United States Department of Labor-Standard Occupational Classification-Major Groups [cited 2017 June 20]. Available from: http://www.bls.gov/soc/major_groups.htm.

15. Bland JM, Altman DG. Statistical methods for assessing agreement between two methods of clinical measurement. Lancet. 1986;8(1):307-10.

16. Scherer MJ, McKee B. Early validity and reliability data for two instruments assessing the predispositions people have toward technology use: continue integration of quantitative and qualitative methods. In: Annual Meeting of the American Educational Research Association, San Francisco, CA, April 20-24, 1992. p.124-346. Available from: https://files.eric.ed.gov/fulltext/ED346124.pdf.

17. Scherer MJ, Cushman LA. Measuring subjective quality of life following spinal cord injury: a validation stud of assistive technology device predisposition assessment. Disabil Rehabil. 2001;23(9)387-93.

18. COFITO. Conselho Federal de Fisioterapia e Terapia Ocupacional. RESOLUÇÃO Nº 458, de 20 de novembro de 2015 [citado 23 nov. 2017]. Disponível em: https://www.coffito.gov.br/nsite/?p=3221#more-3221.

19. Alves ACJ. Tecnologia assistiva: identificação de modelos e proposição de um método de implementação de recursos [Tese]. São Carlos. Universidade Federal de São Carlos; 2013.

20. Raymundo VP. Construção e validação de instrumentos: um desafio para a psicolinguística. Letras Hoje. 2009;44(3):86-93.

21. Alves ACJ. Avaliação de tecnologia assistiva predisposição ao uso: ATD PA Br: versão brasileira. Brasília: Editora Universidade de Brasília; 2017 [citado 13 jun. 2018]. Disponível em: http://repositorio.unb.br/bitstream/10482/31065/1/RELATORIO_AvaliacaodetecnologiaassistivaATDPA.pdf.

Received in: January 31, 2018
Accepted on: June 14, 2018