Validity and Reliability of the Portuguese-Performance Assessment of Self-Care Skills (P-PASS) for Portuguese individuals with disabilities

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Abstract

Background: Due to the increasing need to measure health outcomes and to ensure a more independent life, it is essential to validate instruments capable of assessing the functionality of activities of daily living. The Performance Assessment of Self-Care Skills (PASS), based on three assessment parameters (independence, safety and adequacy), allows health professionals to delineate their interventions more effectively according to the needs of each client. The purpose of this study was to create a Portuguese version of the PASS (P-PASS) and to measure the performance of people with disabilities.

Methods. Linguistic validation was performed through the translation/back-translation procedure. Next, the scale to be completed by health professionals was submitted to a clinical review by a panel of experts. Subsequently, it was applied to 98 people with physical and/or cognitive disabilities. The data collected were then analyzed and the results evaluated in accordance with the three PASS parameters. The results were also analyzed in terms of age and gender.

Results. To create the Portuguese version, one task was removed from the original PASS and seven tasks were combined or adapted. Task independence had the highest scores and adequacy the lowest. In terms of reliability, the P-PASS revealed almost perfect levels of agreement between observers, except for the adequacy parameter of the 'bed mobility' task that showed moderate agreement. In general, the original structure of the PASS was replicated in the Portuguese version. Men presented greater independence than women in the tasks of 'bill paying by ATM' and 'changing TV command batteries.' Participants under 60 years of age had the highest scores overall.

Conclusions. The combination or adaptation of some items to be more culturally relevant is a valid procedure that has been used by other authors during the validation of PASS items. The results obtained by P-PASS showed comparable scores with the original PASS and with other translated/adapted versions. The P-PASS is a valid and reliable scale for the Portuguese population, enabling more effective measurement of health outcomes.

Background

Currently, the global world population is aging because of societal development that positively reflects on quality of life and health. The number of older people is growing significantly and will reach 2 billion by 2050 [1]. According to the same source, the world has 45% more people aged 60 years or older than in 2000, and this number is expected to triple by 2050, while the number of youth aged 10–14 years is expected to increase by only 11%. Also, by 2030 the number of older people is projected to be higher than the number of children aged 0–9 years (1.4 billion versus 1.3 billion), and by 2050 the world is expected to have more people aged 60 years or older than youth aged 10–24 years (2.1 billion versus 2.0 billion) [1].

Portugal is not an exception to these population trends. We are an aged country and the increase in the number of seniors is highly significant. In fact, in half a century, there has been a rapid increase in the

number of older people in Portugal, from 708,569 to 2,010,064. This growth is expected to continue at least until 2040 [2]. In 2017 we were the country with the fourth highest percentage of people aged 60 years or older (27.9%) and, in 2050, we are expected to occupy the third position, with 41.7% of older people. Furthermore, elderly dependence is increasing and, currently, Portugal is among those countries that have the lowest expectation of a healthy life at age 65, especially women [3]. Therefore, efforts to improve the quality of life during old age should be one of the main challenges of today's society.

Several authors point to the existence of a significant association between the level of disability in activities of daily living (ADL) and the increased probability of having depression, as well as a reduction in the quality of life [4]. In addition, basic (BADL) and instrumental ADL (IADL) enable people to participate in their immediate community. In older people, the greater the disability in ADL the greater may also be the decline in cognitive abilities [5]. In addition, many older people experience disability in IADL as their age increases [6]. Therefore, early identification of the main deficiencies in the independence of individuals in their daily living activities enables more appropriate interventions to prevent disability [7]. Consequently, it is crucial to increase knowledge regarding the assessment of BADL and IADL functionality, and in the use of assessment tools, thus enabling the improvement of the health care provided.

Multiple measurement instruments are available for evaluating BADL and IADL. Some instruments have already been validated for the Portuguese population, for example, the Barthel Index [8] and the Lawton Index [9]. However, there are few validated performance instruments appropriate for the older Portuguese population. One potential instrument, the Performance Assessment of Self-Care Skills (PASS) [10, 11], is a performance-based, criterion-referenced observational tool. The PASS is designed to evaluate clients' abilities to live independently in their community. It is particularly suited for cultural adaptation because its manual provides a template for developing test items that are relevant for a country's population. The purpose of this study was to validate the PASS for the Portuguese population (P-PASS) by adapting and developing test items relevant to the Portuguese population and establishing the validity (content, construct) and reliability (internal consistency, interrater) of the new instrument.

Methods

Validity and reliability studies were conducted in Portugal in 2019. The studies involved two phases: (i) translation and cultural validation of the P-PASS, including content validity; and (ii) reliability of the P-PASS, followed by construct validity.

Phase I: Translation and cultural validation of P-PASS

To create the P-PASS, approval for cultural adaptation was obtained from the PASS authors. The original PASS version encompasses 26 items in four domains: functional mobility (FM), basic activities of daily living (BADL), cognitive instrumental activities of daily living (CIADL) and physical instrumental activities of daily living (PIADL) (see Table 1).

Content validity of the PASS was based on four questionnaires and is reported elsewhere [12, 13, 14, 15]. Test-retest and inter-rater reliability for the PASS were acceptable. (For more information on the PASS see Chisholm et al., 2014) [16, 17]. For the purposes of task observation and scoring, each of the 26 tasks is broken down into subtasks. Each subtask indicates the action that is to be carried out by clients and the quality/adequacy of the outcome to be achieved by the action. Three distinct dimensions are measured by the PASS: (i) independence (type/amount of assistance needed to initiate, execute, and complete a task); (ii) safety (risks to people or environment); and (iii) adequacy (performance skill/quality or acceptability of action/product). A table was developed to help the evaluator to assign a score from 0 to 3 for each parameter (see Table 2). It should be noted that the independence score is obtained by averaging the scores registered in each subtask. For the remaining parameters, the task's score is global.

As a first step in cultural adaptation and validation of the P-PASS [18, 19], a translation from American English to European Portuguese was independently conducted by two Portuguese translators, who translated the 57 page protocol, including test conditions, task instructions, task/subtask profile, and scoring grid for each of the 26 tasks. A third translator translated the test manual. Differences between the two Portuguese translations were resolved through consensus to yield the P-PASS Version 1. Next, an English language native translator performed the back translation, which was compared to the original PASS to verify semantic equivalence. Subsequently, for content validity, a panel of health care professionals analyzed the relevance of the 26 tasks, including the way in which they were operationalized, for the adult Portuguese population. To test the content validity, the P-PASS was applied to a group of lay people consisting of old or physically/cognitively disabled adults.

Table 1
– Tasks and domains assessed by the original PASS version

Domain	Task
FM	bed mobility; stair use; toilet mobility and management; bathtub and shower mobility; indoor walking
BADL	oral hygiene; trimming toenails; dressing
PIADL	taking out garbage; changing bed linens; sweeping; cleanup after meal preparation
CIADL	shopping; telephone use; medication management; obtaining critical information from the media (auditory); obtaining critical information from the media (visual); flashlight repair; home safety; oven use; use of sharp utensils; bill paying by check; checkbook balancing; mailing bills; playing bingo; stovetop use
Legend: FM – Functional mobility;	
BADL – Basic activities of daily living;	
PIADL – Physical instrumental activities of daily living;	
CIADL – Cognitive instrumental activities of daily living.	
Source: [10]	

Part 2: Reliability and construct validity study

To test the reliability of the Portuguese version, we addressed internal consistency and interrater reliability between two professionals assessing the same participants. Internal consistency was assessed with Cronbach's alpha coefficient, based on the original structure provided by the authors. This coefficient should have scores between 0.7 and 0.9 [20]. The agreement between professionals reached beyond chance was tested using Cohen's kappa [21]. Following Landis and Koch, negative values indicate no agreement, values from 0 to 0.20 slight agreement, from 0.21 to 0.40 fair agreement, from 0.41 to 0.60 moderate agreement, from 0.61 to 0.80 substantial agreement, and from 0.81 to 1 an almost perfect agreement [22].

Construct validity was assessed by performing known-group analyses and by exploratory factor analysis (structural validity). Known group analysis consisted of age and gender to ascertain whether they could be considered as two determining variables of independence, safety and adequacy in the performance of different tasks. A sample was constituted of participants of both genders, different ages and with various clinical conditions. The inclusion criteria were adults (18–60) and older adults (≥ 61) with some type of physical and/or cognitive disability. The exclusion criteria were people who were not able to express themselves clearly and coherently orally or in writing.

For descriptive statistics, means and standard deviations were calculated for each of the tasks for independence, safety, and adequacy. It should be noted that this study was research oriented, (i.e., its purpose was to establish the validity and the reliability of the P-PASS), so all tasks were evaluated for all

clients. In a clinic setting, however, we would only select the relevant tasks for a particular client for clinical measurement and follow-up. In this study, even if participants did not regularly perform a P-PASS task for any reason, we still assessed whether they could or could not perform that task. This is why, in the current study, all tasks were assessed for all participants.

For age, ANOVA was performed for three age groups (< 60 , $61-79$, ≥ 80). If a significant difference occurs, a post-hoc Scheffé's method was used. For gender, the Student's t-test for independent samples was used. To further test construct validity we used principal component analysis with Varimax rotation and Kaiser normalization, after confirmation with Kaiser-Meyer-Olkin Measure (KMO) of Sampling Adequacy and Bartlett's test of sphericity [23, 24]. KMO, indicating the proportion of data variance explained by the underlying factors, should be as close to 1 as possible, and significant levels < 0.05 show that the factor analysis may be useful. Data were processed using SPSS version 23.

The study was approved by the Ethics Committee of the Faculty of Medicine of the University of Coimbra and all participants gave informed consent after the study objectives were clarified.

Results

Translation and cultural validation of P-PASS, Content validity

During the translation and cultural validation of P-PASS, the expert panel decided that one CIADL task (bingo) should be removed because it was not relevant for independent living of the older adult Portuguese population. 'Bill paying by check', 'checkbook balancing', 'mailing bills', 'obtaining critical information from auditory media', 'obtaining critical information from visual media', 'flashlight repair', and 'oven use' were combined or adapted to yield 'bill paying by ATM', 'obtaining critical information from the TV', 'changing TV command batteries', and 'microwave use'. Thus, the P-PASS consists of 22 task items: five FM, three BADL, ten CIADL, and four PIADL. Table 3 shows the 22 tasks included in the P-PASS. The independence, safety, and adequacy scoring system from the original pass was retained. When administered to a group of older adults and disabled adults no major concerns were raised about the content of the P-PASS.

Table 3
– Tasks assessed by the P-PASS version

Type	Task	P-PASS version	Original PASS version
FM	1	<i>Ter mobilidade na cama</i>	bed mobility
	2	<i>Utilizar escadas</i>	stair use
	3	<i>Ter mobilidade e utilizar a casa de banho</i>	toilet mobility and management
	5	<i>Ter mobilidade na banheira e no polibã</i>	bathtub and shower mobility
	17	<i>Andar dentro de casa</i>	indoor walking
BADL	4	<i>Fazer a higiene oral</i>	oral hygiene
	6	<i>Cortar as unhas dos pés</i>	trimming toenails
	7	<i>Vestir</i>	dressing
PIADL	10	<i>Levar o lixo à rua</i>	heavy housework: taking out garbage
	13	<i>Fazer a cama de lavado</i>	heavy housework: changing bed linens
	16	<i>Varrer</i>	light housework: sweeping
	22	<i>Arrumar após a preparação da refeição</i>	light housework: cleanup after meal preparation
CIADL	8	<i>Fazer compras</i>	money management: shopping
	9	<i>Pagar contas com multibanco</i>	money management: bill paying by ATM
	11	<i>Utilizar o telefone/telemóvel</i>	telephone use
	12	<i>Gerir a medicação</i>	medication management
	14	<i>Obter informação importante da televisão</i>	obtaining critical information from TV
	15	<i>Mudar as pilhas de um comando de televisão</i>	home maintenance: changing TV command batteries
	18	<i>Ter segurança em casa</i>	home safety
	19	<i>Utilizar o micro-ondas</i>	meal preparation: microwave use

Legend: FM – Functional mobility;

BADL – Basic activities of daily living;

PIADL – Physical instrumental activities of daily living;

CIADL – Cognitive instrumental activities of daily living.

Type	Task	P-PASS version	Original PASS version
	20	<i>Utilizar o fogão</i>	meal preparation: stovetop use
	21	<i>Utilizar utensílios afiados</i>	meal preparation: use of sharp utensils
Legend: FM – Functional mobility;			
BADL – Basic activities of daily living;			
PIADL – Physical instrumental activities of daily living;			
CIADL – Cognitive instrumental activities of daily living.			

Reliability

As in the original PASS structure, Cronbach's alpha indicators evidenced an almost perfect internal consistency for FM (independence: 0.927; safety: 0.916; adequacy: 0.917), PIADL (independence: 0.924; safety: 0.911; adequacy: 0.904), and CIADL (independence: 0.951; adequacy: 0.939), and a substantial agreement for BADL (independence: 0.787; safety: 0.755; adequacy: 0.782).

Moreover, Cohen's kappa, measuring the agreement between professionals when assessing the same subject, and performed in a sample of 30 individuals (13 of them females) recruited from the Association of Cerebral Palsy of Coimbra, provided almost perfect scores (independence: from 0.917 to 1.000; safety: from 0.920 to 1.000; adequacy: from 0.819 to 1.000). The only exception was the moderate agreement (0.591) on the adequacy parameter of the 'bed mobility' task, where six out of 30 pairs of professionals did not agree, changing scores 2 and 3.

Construct validity

A sample composed of 98 clients was recruited from: a Medium Duration Continuing Care Unit (37), a Night Center of a Rest Home (15), the Association of Cerebral Palsy of Coimbra (30), and the community (16). Subjects had a mean age of 64.2 ± 22.9 years (median: 68.5 years), 38.8% were over 80 years old, and 61.2% were female. In 38% of the cases, the P-PASS was applied in the context of a Continued Care Unit. Table 4 presents the results after administering the P-PASS to our sample.

Among the FM tasks, 'stair use' had the lowest scores (independence: 1.71; safety: 1.62; adequacy: 1.50), whereas 'indoor walking' had the highest scores (independence: 2.54; safety: 2.47; adequacy: 2.21). 'Trimming toenails' was the most difficult BADL task to perform (independence: 1.13; safety: 1.00; adequacy: 0.71) and 'oral hygiene' was the least problematic BADL task (independence: 2.53; safety: 2.56; adequacy: 2.32). For the PIADL tasks, the scores were more similar to each other. However, 'changing bed linens' scores were the lowest (independence: 1.55; safety: 1.65; adequacy: 1.35) and 'taking out garbage' the highest (independence: 2.14; safety: 1.98; adequacy: 1.79). Lastly, for CIADL tasks, the lowest scored tasks were 'bill paying by ATM' (independence: 1.61; adequacy: 1.60) and 'stovetop use' (independence: 1.64; safety: 1.37; adequacy: 1.51); the highest were the 'use of sharp utensils' (independence: 2.37; safety: 2.41; adequacy: 2.13) and 'telephone use' (independence: 2.18; adequacy: 1.87). 'Obtaining critical

information from TV' also yielded high scores (independence: 2.12; adequacy: 2.01). Following the original PASS scoring system, six tasks were not scored for safety because they did not present immediate danger to the individual or the environment: 'shopping', 'bill paying by ATM', 'telephone use', 'obtaining critical information from the TV', 'changing TV command batteries', and 'home safety'.

Testing construct validity, in relation to age (Table 5), in general, the majority of scores were significantly lower for individuals 80 years old or older than for younger individuals. However, no differences were found for the FM task 'stair use' (independence: $p = 0.358$; safety: $p = 0.298$; adequacy $p = 0.628$), for BADL and independence tasks 'oral hygiene' ($p = 0.263$) and 'trimming toenails' ($p = 0.191$), and for CIADL tasks 'stovetop use' (independence: $p = 0.247$; adequacy: $p = 0.268$) and 'use of sharp utensils' (independence: $p = 0.281$; safety: $p = 0.808$).

When analyzing the impact of gender (Table 6) on the performance of the 22 tasks for independence, safety and adequacy, in general, no significant differences were found between men and women. There were, however, two exceptions for independence, with men scoring higher than women: 'bill paying by ATM' ($p = 0.035$) and 'changing TV command batteries' ($p = 0.052$).

For structural validity, applying principal components factor analysis, we obtained very good scores for KMO (independence: 0.944; safety: 0.924; adequacy: 0.928) and for significance associated to Bartlett's test of sphericity (independence: <0.001 ; safety: <0.001 ; adequacy: <0.001). In general, all dimensions followed the criteria for a good factor structure. However, the BADL task 'trimming toenails', independent of the number of factors selected, always appeared alone in a sole factor. Therefore, we decided to drop it from this analysis.

Looking at the independence parameter, we found three factors that explained 80.8% of the total variance. FM and BADL tasks were together in one factor and CIADL and PIADL tasks were each one factor. However, contrary to the original structure, 'stovetop use' belonged to the PIADL factor and the tasks 'use of sharp utensils', 'microwave use' and 'taking out garbage' belonged to the first factor together with FM and BADL tasks.

Concerning safety, an almost similar situation to independence was found. That is, three factors explained 77.1% of the total variance. The first factor was formed by FM and BADL tasks, the second one by PIADL tasks and the third one by CIADL tasks. However, 'medication use' was considered as belonging to the first factor, the tasks 'stair use' and 'use of sharp utensils' as belonging to the PIADL factor, and, lastly, the tasks 'stovetop use' and 'microwave use' as belonging to CIADL factor.

Finally, considering the adequacy parameter, we also found three factors explaining 77.1% of the total variance. The first factor also included FM and BADL tasks, the second factor encompassed PIADL tasks, and the third, CIADL tasks. The tasks 'sweeping' and 'taking out garbage' also appeared together with FM and BADL. Moreover, the tasks 'use of sharp utensils', 'stovetop use' and 'microwave use' showed themselves together with PIADL.

Table 4
– Scores from tasks (Independence, safety, adequacy) (n = 98)

Domain	Task	Independence		Safety		Adequacy	
		Mean	Stdv	Mean	stdv	Mean	stdv
FM	bed mobility	2.23	1.10	2.12	1.21	1.95	1.08
	stair use	1.71	1.41	1.62	1.38	1.50	1.28
	toilet mobility and management	2.30	1.08	2.18	1.23	1.88	1.09
	bathtub and shower mobility	1.98	1.24	1.70	1.22	1.75	1.09
	indoor walking	2.54	1.04	2.47	1.05	2.21	1.00
BADL	oral hygiene	2.53	0.83	2.56	0.83	2.32	0.81
	trimming toenails	1.13	1.19	1.00	1.29	0.71	1.08
	dressing	2.05	1.14	1.92	1.24	1.76	0.96
PIADL	taking out garbage	2.14	1.13	1.98	1.20	1.79	1.12
	changing bed linens	1.55	1.13	1.65	1.21	1.35	1.06
	sweeping	1.73	1.31	1.79	1.31	1.50	1.19
	cleanup after meal preparation	1.89	1.09	1.79	1.20	1.70	1.02
CIADL	shopping	1.88	1.16	-	-	1.75	1.20
	bill paying by ATM	1.61	1.19	-	-	1.60	1.29
	telephone use	2.18	1.09	-	-	1.87	1.16
	medication management	1.72	1.07	2.24	1.15	1.56	1.20
	obtaining critical information from TV	2.12	1.06	-	-	2.01	1.10
	changing TV command batteries	1.77	1.13	-	-	1.70	1.21
	home safety	2.06	1.04	-	-	1.81	1.13
	microwave use	2.15	1.03	1.89	1.09	1.79	0.98
	stovetop use	1.64	1.18	1.37	1.16	1.51	1.10
Legend: stdv: standard deviation							
FM – Functional mobility;							
BADL – Basic activities of daily living;							
PIADL – Physical instrumental activities of daily living;							
CIADL – Cognitive instrumental activities of daily living.							

use of sharp utensils	2.37	1.01	2.41	1.05	2.13	0.99
Legend: stdv: standard deviation						
FM – Functional mobility;						
BADL – Basic activities of daily living;						
PIADL – Physical instrumental activities of daily living;						
CIADL – Cognitive instrumental activities of daily living.						

Discussion

In general, the purpose of our study was achieved: to validate the PASS for the Portuguese population (P-PASS) by adapting and developing test items relevant to the Portuguese population and establishing the validity (content, construct) and reliability (internal consistency, interrater) of the new instrument. Validity and reliability scores were very good and consistent with the original PASS as well as other translations/adaptations.

During the development of P-PASS, and following the advice of the expert panel, we decided to remove one task (bingo) from the original PASS because it did not have current relevance to independent living with this particular Portuguese population. Seven other tasks were combined or changed to reflect current practices in the Portuguese population, but the content remained the same. For example, the tasks ‘obtaining critical information from the media (audio)’ and ‘obtaining critical information from the media (visual)’ were combined into ‘obtaining critical information from TV’, which encompasses the visual and hearing components. The task ‘oven use’, while significant, was considered difficult to evaluate, as it requires very specific and difficult-to-obtain testing conditions, especially when the measurement is not made in the residence of the clients, and was changed to ‘microwave use.’ Likewise, ‘bill paying by check,’ ‘checkbook balancing,’ and ‘mailing bills’ (money management) were changed to ‘bill paying by ATM.’ Lastly, the home maintenance task of ‘flashlight repair’ was changed to ‘changing TV command batteries.’ The operationalization of the aforementioned tasks into the Portuguese version was carried out through the process for constructing new items available in the PASS user manual and the PASS scoring system was retained. This type of procedure was similar to that used by other authors during the validation of the PASS scale [25].

The P-PASS results for the study participants indicated that the outcome measures as shown in Table 4 reflect the disability status of the participants. Scores of 3 on the P-PASS are consistent with the skills needed for living in the community. However, 11 of the mean independence scores are below 2, indicating that the evaluators needed to provide the participants verbal encouragement, verbal cues, verbal instructions, gestures, a change of the context or task or demonstrations to initiate, continue or complete the tasks (see Table 2). This is consistent with the settings from which 82 of the 98 participants were recruited – nursing or care homes.

Table 2
– PASS scoring criteria for independence, safety and adequacy

Score	Independence	Safety	Adequacy	
			Process	Quality
3	Was not provided assistance to start, continue or complete the task	Safety procedures were observed	Subtasks performed with accuracy and economy of effort and action	Acceptable (respected standards)
2	Was not provided assistance at level 7 to 9, but occasionally it was provided assistance at level 1 to 6	Observed minimal risks, but was not provided any assistance	Subtasks in general performed with accuracy and economy of effort and action; occasional lack of efficiency, redundant or irrelevant action; were executed all the steps	Acceptable (respected standards, but it is possible to improve)
1	Was not provided assistance at level 9, but occasionally it was provided assistance at level 7 or 8; or was constantly given assistance at level 1 to 6	Safety risks were observed, aid was provided, to prevent harm/damage	Subtasks in general performed with lack of accuracy and/or economy of effort and action; consistently unreasonable or redundant actions; there may be steps not executed	Doubtful (partially respected standards)
0	Was provided assistance at level 9; or was constantly provided assistance at level 7 or 8; or unable to start, continue or finish the subtask or task	Risks were observed for safety of such gravity that the task was interrupted or carried out by the evaluator to avoid harm/damage	Subtasks constantly performed with lack of accuracy and/or economy of effort and action for the completion of the task becomes impossible	Unacceptable (does not respect the standards)
Source: [10] Note: Levels of assistance for scoring Independence: 0 – no assistance; 1 – verbal encouragement; 2 – verbal cues; 3 – verbal instructions;				
4 – gestures; 5 – change of the context or task; 6 – demonstration; 7 – physical guidance; 8 – physical support; 9 – total assistance.				

Table 5
– Constructed validly based on Age

Domain	Task	Age	Independence		Safety		Adequacy	
		years	Mean	F/Sig	Mean	stdv	Mean	stdv
FM	bed mobility	< 60	2.67	F = 5.219	2.74	F = 5.219	2.51	F = 9.341
		[61–80[	2.13	p = 0.007	2.08	p = 0.007	1.80	p < 0.001
		≥ 80	1.89	0.007	1.58		1.53	0.001
	stair use	< 60	1.98	F = 1.040	1.91	F = 1.005	1.60	F = 0.468
		[61–80[	1.56	p = 0.358	1.48	p = 0.298	1.60	p = 0.628
		≥ 80	1.55		1.45		1.34	
	toilet mobility and management	< 60	2.61	F = 2.641	2.74	F = 7.689	2.20	F = 3.105
		[61–80[	2.24	p = 0.077	1.16	p = 0.001	1.88	p = 0.049
		≥ 80	2.05		1.68		1.58	
	bathtub and shower mobility	< 60	2.42	F = 4.451	2.57	F = 24.881	2.17	F = 6.310
		[61–80[	1.96	p = 0.014	1.68	P < 0.001	1.80	p = 0.003
		≥ 80	1.58		0.92		1.32	
	indoor walking	< 60	2.97	F = 6.003	2.91	F = 7.465	2.71	F = 10.470
		[61–80[	2.48	p = 0.004	2.52	p = 0.001	2.24	p < 0.001
		≥ 80	2.17		2.03		1.74	
BADL	oral hygiene	< 60	2.26	F = 1.354	2.80	F = 2.912	2.43	F = 3.701
		[61–80[	2.59	p = 0.263	2.56	p = 0.059	2.56	p = 0.028
		≥ 80	2.36		2.34		2.05	

Legend: stdv: standard deviation

FM – Functional mobility;

BADL – Basic activities of daily living;

PIADL – Physical instrumental activities of daily living;

CIADL – Cognitive instrumental activities of daily living.

	trimming toenails	< 60	1.30	F = 1.683	1.34	F = 3.627	1.14	F = 5.581
		[61–80[	1.31	p = 0.191	1.16	p = 0.030	0.64	p = 0.005
		≥ 80	0.85		0.58		0.34	
	dressing	< 60	2.55	F = 6.450	2.74	F = 17.814	2.09	F = 3.917
		[61–80[	1.97	p = 0.002	1.76	p < 0.001	1.72	p = 0.023
		≥ 80	1.64		1.26		1.47	
PIADL	taking out garbage	< 60	2.51	F = 5.869	2.42	F = 6.688	2.25	F = 7.401
		[61–80[	2.31	p = 0.004	2.12	p = 0.002	1.84	p = 0.001
		≥ 80	1.68		1.47		1.32	
	changing bed linens	< 60	1.99	F = 7.467	2.11	F = 6.470	1.60	F = 4.138
		[61–80[	1.69	p = 0.001	1.76	p = 0.002	1.56	p = 0.019
		≥ 80	1.05		1.15		0.97	
	sweeping	< 60	2.00	F = 3.627	2.17	F = 7.406	1.74	F = 4.119
		[61–80[	2.00	p = 0.030	2.16	p = 0.001	1.80	p = 0.019
		≥ 80	1.29		1.18		1.08	
	cleanup after meal preparation	< 60	2.32	F = 5.618	2.46	F = 11.563	2.00	F = 4.241
		[61–80[	1.89	p = 0.005	1.68	p < 0.001	1.80	p = 0.017
		≥ 80	1.50		1.24		1.34	
CIADL	shopping	< 60	2.52	F = 16.850	-	-	2.29	F = 12.189
		[61–80[	2.04	p < 0.001	-	-	2.00	p < 0.001
		≥ 80	1.18				1.08	

Legend: stdv: standard deviation

FM – Functional mobility;

BADL – Basic activities of daily living;

PIADL – Physical instrumental activities of daily living;

CIADL – Cognitive instrumental activities of daily living.

bill paying by ATM	< 60	2.39	F = 21.820	-	-	2.37	F = 18.102
	[61–80[	1.67	p < 0.001	-	-	1.72	p < 0.001
	≥ 80	0.86				0.82	
telephone use	< 60	2.60	F = 7.529	-	-	2.31	F = 9.188
	[61–80[	2.34	p = 0.001	-	-	2.12	p < 0.001
	≥ 80	1.70				1.29	
medication management	< 60	2.53	F = 23.279	2.83	F = 10.342	2.60	F = 45.997
	[61–80[	1.78	p < 0.001	2.20	p < 0.001	1.48	p < 0.001
	≥ 80	0.93		1.71		0.66	
obtaining critical information from TV	< 60	2.58	F = 7.824	-	-	2.51	F = 12.653
	[61–80[	2.14	p = 0.001	-	-	2.24	p < 0.001
	≥ 80	1.67				1.39	
changing TV command batteries	< 60	2.43	F = 18.990	-	-	2.37	F = 18.506
	[61–80[	1.93	p < 0.001	-	-	1.92	p < 0.001
	≥ 80	1.05				0.92	
home safety	< 60	2.77	F = 23.587	-	-	2.46	F = 18.149
	[61–80[	2.08	p < 0.001	-	-	1.96	p < 0.001
	≥ 80	1.40				1.10	
microwave use	< 60	2.50	F = 5.073	2.40	F = 7.975	2.06	F = 2.795
	[61–80[	2.23	p = 0.008	1.84	P = 0.001	1.80	p = 0.066
	≥ 80	1.77		1.45		1.53	

Legend: stdv: standard deviation

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	stovetop use	< 60	1.85	F =	1.83	F =	1.66	F =
		[61–	1.71	1.411	1.24	4.918	1.64	1.268
		80[	1.40	p =	1.03	p =	1.29	p =
		≥ 80		0.247		0.009		0.268
	use of sharp utensils	< 60	2.49	F =	2.40	F =	2.00	F =
		[61–	2.51	1.285	2.52	0.213	2.56	3.273
		80[	2.16	p =	2.34	p =	1.97	p =
		≥ 80		0.281		0.808		0.042

Legend: stdv: standard deviation

FM – Functional mobility;

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Table 6
– Constructed validly based on Gender

Domain	Task	Gender	Independence		Safety		Adequacy	
			Mean	t/Sig	Mean	stdv	Mean	stdv
FM	bed mobility	Male	2.15	t =0.509	2.18	t =0.400	1.97	t =0.180
		Female	2.27	p = 0.612	2.08	p = 0.690	1.93	p = 0.858
	stair use	Male	1.68	t =0.178	1.58	t =0.247	1.37	t =0.809
		Female	1.73	p = 0.859	1.65	p = 0.805	1.58	p = 0.420
	toilet mobility and management	Male	2.21	t =0.666	2.21	t =0.171	1.79	t =0.637
		Female	2.36	p = 0.507	2.17	p = 0.864	1.93	p = 0.526
	bathtub and shower mobility	Male	1.94	t =0.243	1.89	t =1.234	1.79	t =0.322
		Female	2.00	p = 0.808	1.58	p = 0.220	1.71	p = 0.748
	indoor walking	Male	2.67	t =1.040	2.63	t =1.293	2.34	t =1.010
		Female	2.45	p = 0.301	2.37	p = 0.199	2.13	p = 0.315
BADL	oral hygiene	Male	2.44	t =0.856	2.55	t =0.082	2.26	t =0.517
		Female	2.59	p = 0.394	2.56	p = 0.935	2.35	p = 0.606
	trimming toenails	Male	1.21	t =0.535	1.24	t =1.403	0.84	t =0.976
		Female	1.08	p = 0.594	0.85	p = 0.165	0.62	p = 0.332
	dressing	Male	2.03	t =0.137	2.00	t =0.516	1.71	t =0.363
		Female	2.06	p = 0.891	1.87	p = 0.607	1.78	p = 0.718

Legend: stdv: standard deviation

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PIADL	taking out garbage	Male	2.31	t =1.249	2.26	t =1.884	2.00	t =1.525
		Female	2.02	p = 0.215	1.80	p = 0.063	1.65	p = 0.131
	changing bed linens	Male	1.69	t =0.998	1.89	t =1.585	1.50	t =1.144
		Female	1.46	p = 0.321	1.50	p = 0.116	1.25	p = 0.256
	sweeping	Male	1.64	t =0.479	1.97	t =1.132	1.50	t =0.000
		Female	1.77	p = 0.633	1.67	p = 0.260	1.50	p = 1.000
	cleanup after meal preparation	Male	1.94	t =0.381	1.97	t =1.234	1.71	t =0.128
		Female	1.86	p = 0.704	1.67	p = 0.220	1.68	p = 0.898
CIADL	shopping	Male	2.04	t =1.109	-	-	1.97	t =1.507
		Female	1.78	p = 0.270	-	-	1.60	p = 0.135
	bill paying by ATM	Male	1.93	t =2.142	-	-	1.89	t =1.808
		Female	1.41	p = 0.035	-	-	1.42	p = 0.074
	telephone use	Male	2.18	t =0.001	-	-	1.89	t =0.185
		Female	2.18	p = 0.999	-	-	1.85	p = 0.854
	medication management	Male	1.98	t =1.942	2.31	t =0.555	1.81	t =1.684
		Female	1.55	p = 0.055	2.18	p = 0.580	1.40	p = 0.095
	obtaining critical information from TV	Male	2.22	t =0.793	-	-	2.10	t =0.680
		Female	2.05	p = 0.430	-	-	1.95	p = 0.498

Legend: stdv: standard deviation

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changing TV command batteries	Male	2.05	t =1.966	-	-	1.95	t =1.661
	Female	1.59	p = 0.052	-	-	1.53	p = 0.100
home safety	Male	2.07	t =0.034	-	-	1.81	t =0.067
	Female	2.06	p = 0.973	-	-	1.80	p = 0.947
microwave use	Male	2.21	t =0.452	1.84	t =0.328	1.79	t =0.030
	Female	2.11	p = 0.652	1.92	p = 0.744	1.78	p = 0.976
stovetop use	Male	1.59	t =0.283	1.39	t =0.185	1.53	t =0.115
	Female	1.66	p = 0.777	1.35	p = 0.854	1.50	p = 0.908
use of sharp utensils	Male	2.35	t =0.112	2.34	t =0.492	2.03	t =0.844
	Female	2.38	p = 0.911	2.45	p = 0.624	2.20	p = 0.401
Legend: stdv: standard deviation							
FM – Functional mobility;							
BADL – Basic activities of daily living;							
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As for the results obtained for all three measurement constructs (independence, safety and adequacy), the tasks 'indoor walking', 'oral hygiene', 'taking out garbage', 'telephone use', 'obtaining critical information from TV' and 'use of sharp utensils' required less assistance for independence, safety, and or adequacy from the evaluator compared to other tasks. In the literature, some results agree with ours for these tasks [26–28]. Regarding the task 'use of sharp utensils', it was found that our sample had a superior performance to that described in the literature, whereas the task 'stovetop use' is known to be severely negatively affected, especially in the elderly [26–28]. When only independence was considered, the tasks that needed the least amount of assistance were: 'indoor walking', 'bed mobility', 'bathtub and shower mobility', 'dressing', 'taking out the garbage', 'telephone use', 'microwave use', and 'home safety'. In the task 'bathtub and shower mobility', the results are in accordance with the original studies [17]. However, in the current study 'medication management' was one of the lowest scores for independence in the CIADL group, which is not in agreement with these studies [17]. However, the studies of Njegovan et al. [28] indicate that in older people with cognitive decline, this task emerges as the one that has its functionality most affected. Clinically, some of the items requiring less assistance could be chosen to begin an assessment if these are tasks the client needs to perform, wants to perform, or is expected to

perform in the community. More difficult tasks (those with higher scores) could then be added until the client is unable to initiate, maintain, or complete a task.

Tasks with lower scores, reflecting the need for greater assistance from the evaluator were the FM task 'stair use', the BADL task 'trimming toenails', the PIADL task 'changing bed linens', the CIADL 'bill paying by ATM', and 'stovetop use'. Similar results are confirmed in the literature [17]. The authors Jefferson et al. [26] and Millán-Calenti et al. [27] mention that household management activities yield lower performance scores because they are the first ones where limitations arise in the event of incapacity. In the task 'cleanup after meal preparation', a lower safety score than that indicated by the PASS authors was obtained by our sample [17]. The task that, in our study, presented the lowest score in the parameter of safety in the CIADL group was 'stovetop use', which is in accordance with the literature [17]. Likewise, Jefferson et al. [26] report that meal preparation activities are the first in which people with disabilities experience a loss of functionality. This is also supported by Njegovan et al. [28], who state that elderly people with greater cognitive impairment experience a rapid loss of independence in these types of tasks. Clinically, if the assessment is being conducted to determine if the client can remain in the community or needs institutional care, the assessment could begin with some of these tasks and continue until the client can initiate, maintain, or complete relevant tasks for the discharge environment.

Looking at gender, in the tasks 'bill paying by ATM' and 'changing TV command batteries', male participants presented higher scores than female participants for independence. These findings are in line with those reported in the literature, where women with disabilities due to chronic disease have a higher incidence of incapacity in IADL [27, 29, 30]. These authors argue that as women live longer, they experience a greater number of chronic, but not fatal, diseases, which result in limitations of functionality [27, 11]. It is unclear why women did not do better on the 'microwave use' item, however, given that 84% of the participants lived in care homes, perhaps the women were unfamiliar with microwaves.

Regarding the age variable, overall, younger participants performed better than their older counterparts. This conclusion was also reported in the studies of Millán-Calenti et al. [27, 31], in which the presence of cognitive incapacity or dementia affected functionality in the tasks. Concomitantly, Maciel and Guerra³² argue that the higher the age, the worse a person's functionality.

Finally, comparing the Portuguese version with the original factor structure [8], in general, we were able to replicate the major structural factors. However, we failed to isolate the FM factor from the BADL factor. Both domains always appear together in a unique factor perhaps explained because the majority of the BADL require FM.

Conclusions

The P-PASS is a culturally and linguistically valid instrument, which can be applied to the Portuguese population. The P-PASS can be seen as a reference criterion for those who are living independently in the community. Community living individuals should be able to perform all 22 tasks independently, safely

and adequately. Having such a tool allows for a more detailed measure of health outcomes, making it possible to administer more rapid and effective interventions for the elderly or disabled. Likewise, given that the assessment is based on observation of everyday task performance, it can be easily understood by the various health professionals that interact with the client. Furthermore, this scale enables the development of scientific studies into the impact of various pathologies on the independence, safety, and adequacy of task performance, enabling more person-centered interventions.

Abbreviations

ADL

Activities of daily living; BADL:Basic activities of daily living; BADL:Basic activities of daily living; CIADL:Cognitive instrumental activities of daily living; FM:Functional mobility; IADL:Instrumental activities of daily living; KMO:Kaiser-Meyer-Olkin Measure; PASS:The Performance Assessment of Self-Care Skills; PIADL:Physical instrumental activities of daily living; P-PASS:Portuguese-Performance Assessment of Self-Care Skills.

Declarations

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Availability of data and materials

The data that support the findings of this study are available from the corresponding author upon reasonable request

Authors' contributions

PLF and MD contributed to the study concept and participated in its design and coordination. ALS performed study procedures and collection of data and was responsible for drafting the manuscript; PLF was responsible for the analysis of data; PLF and MD were responsible for editing of the manuscript; MBH and JCR revised the manuscript. All authors read and approved the final manuscript.

Ethics approval and consent to participate

The Ethics Committee of the Faculty of Medicine of the University of Coimbra approved the study and all participants gave their previous informed consent to participate in the study. There was, under no circumstances, any interference with the health professional decision regarding the best-suited medical approach to each patient.

Competing interests

The authors declare that they have no competing interests.

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