

# Validation of the Brazilian version of the World Health Organization Disability Assessment Schedule 2.0 for institutionalized older adults

*Validação da versão brasileira do World Health Organization Disability Assessment Schedule 2.0 em idosos institucionalizados*

*Validación de la versión brasileña del World Health Organization Disability Assessment Schedule 2.0 en ancianos institucionalizados*

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**Abstract** | Factors associated with the institutionalization of older adults may interfere with the Functioning of this population. There are few instruments that evaluate this component according to the biopsychosocial model. The World Health Organization Disability Assessment Schedule (WHODAS 2.0) is an instrument developed by WHO (World Health Organization) to measure functioning and disability supported by the theoretical-conceptual model of the International Classification of Functioning, Disability and Health (ICF). This study aims to verify the reliability, internal consistency (IC) and criterion validity of the Brazilian version of the WHODAS 2.0 when applied to institutionalized older adults with different health conditions. In total, 100 older adults participated in the study. IC was assessed by Cronbach's alpha. Spearman's coefficient was used to analyze test-retest reliability, with the WHODAS questionnaire being reapplied seven days after the first interview. Criterion validity (convergent and divergent) was also analyzed by Spearman's coefficient by the correlation analysis with the WHOQOL-BREF and the WHOQOL-OLD. As a result, we obtained an IC that was adequate for all domains (Cronbach's alpha  $\geq 0.75$ ), with strong test-retest reliability ( $r > 0.85$ ). In the criterion validity, we obtained only moderate correlations of the

WHODAS 2.0 domains with the WHOQOL-BREF and WHOQOL-OLD domains ( $r = -0.62$ ;  $r = -0.61$  respectively). The psychometric properties tested indicated reliability – good internal consistency and strong test-retest reliability – and qualifications correlations in the criterion value. These results demonstrated that WHODAS 2.0 is a valid and reliable instrument, thus providing an assessment tool for institutionalized older adults following the concepts and principles proposed by WHO for assessing functioning.

**Keywords** | Validation Study; Disability Evaluation; Health of Institutionalized Older Adults; International Classification of Functioning, Disability and Health; Surveys and Questionnaires.

**Resumo** | Fatores associados à institucionalização de idosos podem comprometer a funcionalidade desta população. São escassos os instrumentos que avaliam esse componente conforme o modelo biopsicossocial. Com vistas a medir a funcionalidade e a incapacidade. A Organização Mundial da Saúde (OMS) desenvolveu o World Health Organization Disability Assessment Schedule (WHODAS 2.0) amparado no modelo teórico-conceitual da Classificação Internacional de Funcionalidade, Incapacidade e Saúde (CIF). O objetivo deste estudo foi verificar as propriedades de medida

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(confiabilidade, consistência interna e validade de critério) da versão brasileira do WHODAS 2.0 em idosos institucionalizados com diferentes condições de saúde. Cem idosos participaram do estudo. A consistência interna foi avaliada pelo alfa de Cronbach. O coeficiente de Spearman foi utilizado para analisar a confiabilidade teste-reteste, com a reaplicação do questionário WHODAS após sete dias da primeira entrevista. A validade de critério (convergente e divergente) foi analisada pelo coeficiente de Spearman através da correlação dos domínios do WHODAS com os domínios do WHOQoL-bref e WHOQoL-old, que avaliam qualidade de vida. Como resultado, obtivemos consistência interna adequada para todos os domínios (alfa de Cronbach  $\geq 0,75$ ) e forte confiabilidade de teste-reteste ( $r > 0,85$ ). Na validade de critério, obtivemos apenas correlações moderadas com o WHOQoL-bref e WHOQoL-old ( $r = -0,62$ ;  $r = -0,61$  respectivamente). Esses resultados mostraram que o WHODAS 2.0 é um instrumento válido e confiável como ferramenta de avaliação para idosos institucionalizados ao seguir os mesmos conceitos e princípios propostos pela OMS para avaliação da funcionalidade.

**Descritores** | Estudos de Validação; Avaliação da Deficiência; Saúde do Idoso Institucionalizado; Classificação Internacional de Funcionalidade, Incapacidade e Saúde; Inquéritos e Questionários.

**Resumen** | Los factores asociados a la institucionalización de los ancianos pueden afectar la funcionalidad de esta población. Existen pocos instrumentos que evalúan este componente según el modelo biopsicosocial. Para medir la funcionalidad y la discapacidad, la Organización Mundial de la Salud (OMS)

desarrolló el World Health Organization Disability Assessment Schedule (WHODAS 2.0) con base en el modelo teórico-conceptual de la Clasificación Internacional del Funcionamiento, de la Discapacidad y de la Salud (CIF). El objetivo de este estudio fue verificar las propiedades de medición (fiabilidad, consistencia interna y validez de criterio) de la versión brasileña de WHODAS 2.0 en ancianos institucionalizados con diferentes condiciones de salud. En el estudio participaron cien ancianos. La consistencia interna se evaluó mediante el alfa de Cronbach. Se utilizó el coeficiente de Spearman para analizar la fiabilidad test-retest, con la reaplicación del cuestionario WHODAS siete días después de la primera entrevista. Para evaluar la validez de criterio (convergente y divergente), se utilizó el coeficiente de Spearman mediante la correlación de los dominios WHODAS con los dominios de WHOQoL-bref y WHOQoL-old, que evalúan la calidad de vida. Como resultado, hubo una consistencia interna adecuada para todos los dominios (alfa de Cronbach  $\geq 0,75$ ) y una gran fiabilidad test-retest ( $r > 0,85$ ). En la validez de criterio, hubo solo correlaciones moderadas con WHOQoL-bref y WHOQoL-old ( $r = -0,62$ ;  $r = -0,61$ , respectivamente). Estos resultados apuntan que WHODAS 2.0 es un instrumento válido y fiable en la evaluación de ancianos institucionalizados siguiendo los mismos conceptos y principios propuestos por la OMS para evaluación de funcionalidad.

**Palabras clave** | Estudio de Validación; Evaluación de la Discapacidad; Salud del Anciano Institucionalizado; Clasificación Internacional del Funcionamiento, de la Discapacidad y de la Salud; Encuestas y Cuestionarios.

## INTRODUCTION

The changes in the age profile of the population – especially in poor and developing countries, did not reflect an increase in healthy life expectancy<sup>1</sup>. The prevalence of chronic diseases, in addition to unhealthy lifestyles, has affected the population, leading to an increase in disability indicators in older adults and the need for continuous monitoring of this population with a multimorbidity profile and greater vulnerability, or in a situation of dependency<sup>2</sup>.

Considering the difficulty to meet the biopsychosociocultural needs of these individual, referral to long-stay institutions for the elderly (LSIE) emerges as the most adopted non-family care strategy<sup>3</sup>. LSIE are

institutions intended for long-term collective housing for those in need. They are institutionalized due to issues concerning precarious or nonexistent family and social support, and/or unfavorable financial conditions<sup>4</sup>.

The way LSIEs work seeks to value independence, to preserve self-esteem, and to respect the individuality of older adult, but in reality these institutions experience progressive loss of autonomy and independence<sup>3,4</sup>. This situation is due to difficulties these individuals face in adapting to new conditions, which are aggravated by pre-existing comorbidities<sup>5</sup>. Some factors contribute to the decline of functioning in institutionalized older adults: poor nutrition<sup>6</sup>; high levels of dependence and inactivity<sup>5</sup>, and social isolation.<sup>1</sup> A more sensitive look is essential when observing the physical and psychological

integrity of the older adults, as well as their various aspects, such as autonomy and their limitations for daily activities, social participation, family, and/or financial support<sup>4</sup>. Then, it is extremely significant, for public health, to evaluate the disability and functioning of institutionalized older adults by the biopsychosocial model with a unified and standardized language<sup>7</sup>.

The World Health Organization (WHO) published the International Classification of Functioning, Disability and Health (ICF); this classification considers functioning as a term that covers all functions, activities, and participation, in addition to environmental factors capable of interact with all these constructions<sup>7</sup>. Based on the theoretical-conceptual model of the ICF, WHO also developed the World Health Organization Disability Assessment Schedule (WHODAS 2.0), a generic, transculturally adapted tool<sup>8</sup> that provides disability and/or functioning scores from the perspective of the respondent, which enables targeting and monitoring the impact of health interventions<sup>9</sup>.

According to the literature<sup>10</sup>, there is a lack of instruments to assess functioning in institutionalized older adults according to the biopsychosocial model in compliance with what is proposed by the ICF. The availability of a reliable, self-reported tool complying with the WHO proposal for disability assessment in institutionalized older adults would be useful in offering a more complete approach to health and functioning<sup>10</sup>. The creation of patient-centered interventions and actions would also be possible with this tool, since the WHODAS 2.0 analyzes different dimensions of social participation and activities<sup>9</sup>, enabling the recognition of factors associated with the disability of older individuals in LSIE.

The WHODAS 2.0 has already been translated and validated into different languages and different health conditions<sup>11,12</sup>. However, we do not know any published studies that validate the Brazilian version of the instrument for use in institutionalized individuals. Before an instrument is considered suitable, it must offer valid and reliable data for assessment of population health; researchers unanimously advocate the use of reliability and validity as the main properties for validation of an instrument<sup>13</sup>. Thus, this study aims to verify the reliability, internal consistency (IC) and criterion validity of the Brazilian version of the WHODAS 2.0 for application in institutionalized older adults with different health conditions, in order

to ensure that consistent and reliable data are obtained when investigating the functioning and/or disability of institutionalized older adults.

## METHOD

### Participants

The study was carried out with older adults of both sexes living in seven LSIE in the city of Uberaba, State of Minas Gerais. A sample composed of 100 participants was defined as this value allows obtaining a 95% confidence interval with standard deviation (SD)  $\pm 0.34$ <sup>14</sup>.

The inclusion criteria chosen were: individuals aged 60 years or older and residing in an LSIE. Older adults with cognitive impairment shown by the mini-mental state exam (MMSE) were excluded, considering the subject's degree of education<sup>15</sup>; older adults who could not answer the interview questions due to hearing impairment and/or communication difficulty due to aphasia; those with some disease or disorder with some type of functional impairment that is not characteristic of the aging process, such as severe neurological impairment; and those who did not perform the retest after seven days. The informed consent form was signed by the interviewees or their legal representatives.

### Procedures and data collection

All interviewers underwent a prior training process that included the theoretical explanation of the WHODAS 2.0, presentation of the manual and prior application of the questionnaire. During the visits to the LSIE facilities, each individual was given privacy and comfort in reserved rooms in order to allow the collection of more accurate answers.

Initially, the participants were instructed about the research. Then, the participants' demographic and socioeconomic data were collected as a form of initial identification. After the application of the MMSE, three instruments were used: the 36-item version of the WHODAS 2.0, the World Health Organization abbreviated version quality of Life (WHOQoL-BREF)<sup>16</sup> and the World Health Organization Quality of Life-Older Adults Module Group (WHOQoL-OLD)<sup>17</sup>. For data collection, two interviews were conducted; in

the second interview, only the WHODAS was reapplied, by different and equally trained interviewers<sup>9</sup>. The seven-day interval between interviews was observed as it guarantees good stability, bearing in mind that a longer period could affect any changes in the overall state of the institutionalized individuals and a shorter period could be affected by the respondent's memory<sup>9</sup>. The flowchart with the steps of data collection is represented by Figure 1. The collection was performed in the period from September 2016 to April 2017, and from June to August 2019.

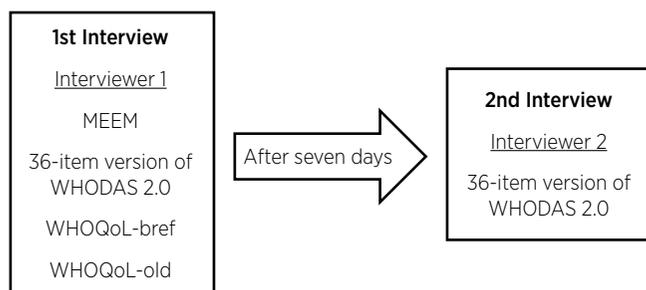


Figure 1. Flowchart of data collection steps

## Instruments

For this research, the following instruments were used: MMSE<sup>15</sup>; 36-item version WHODAS 2.0; WHOQoL-BREF<sup>16</sup>; and WHOQoL-OLD<sup>17</sup>, all applied by interviews.

## WHODAS 2.0

The WHODAS 2.0 is a generic instrument developed by WHO to provide a standardized method of measuring health and disability in an intercultural manner<sup>8</sup>. This instrument approaches functioning according to the following domains: “cognition”, with questions about communication and reasoning activities; “mobility”, which includes activities such as standing up, moving around inside the house and long distance walking; “self-care”, concerning difficulty to shower, to get dressed, to eat, and to stand up on one’s own; “Getting along”, concerning difficulty to interact with others; “life activities”, which includes questions about difficulty in daily household chores and work or school activities, and “participation”, which assesses the social dimension, such as community activities, barriers, and obstacles in the respondent’s surrounding environment, in addition to problems with other issues, like upholding one’s personal dignity<sup>9</sup>.

The WHODAS 2.0 has three distinct versions, which differ in the number of items: the reduced version (12 items); the full version (36 items) or the hybrid version (called 12+24). Each question has five alternatives as possible answers, the score ranges from 1 (no difficulty) to 5 (extreme difficulty or cannot do). The domain and overall scores are computed and can range from 0 to 100 (worst functioning). The WHODAS 2.0 can be self-applied by interview or applied to a *proxy* respondent. This study used the full version by interview. Out of the 36 items of the instrument, 32 were used and four were excluded because they concerned “work or school activities,” such exclusion is allowed when the respondents do not perform these activities<sup>9</sup>.

## WHOQoL-BREF

In its Portuguese language version, it is a validated instrument of rapid application and useful for studies that evaluate quality of life. It comprises 26 questions divided into four domains: “physical,” “psychological,” “social relations,” and “environmental,” with two general questions about health and quality of life. The score is based on a Likert scale (1 to 5 points), in which the highest score represents the best quality of life<sup>16</sup>.

## WHOQoL-OLD

Developed for assessing quality of life of the elderly population, it can be used in multicultural investigations. It has 24 items on a Likert scale (1 to 5 points) and is divided into six domains: “sensory abilities,” “autonomy,” “past, present, and future activities,” “social participation,” “death and dying,” and “intimacy.” Each domain is composed of four items, generating a score that can range from 4 to 20 points, converted by syntax on a scale from 0 to 100. Higher scores represent better quality of life<sup>17</sup>.

## MMSE

Widely used, it allows the assessment of cognitive function and the screening of dementia. Since it was created, its psychometric characteristics have been evaluated both in its original version and for the several translations/adaptations into various languages and countries. In our study, we used the cut-off points adapted

to schooling: 18 (illiterate), 21 (1 to 3 years of schooling), 24 (4 to 7 years), and 26 (>7 years)<sup>15</sup>.

### Measuring the measurement properties

For the validation process of the WHODAS 2.0 in institutionalized older adults, three measurement properties were analysed: internal consistency, test-retest reliability, and criterion validity.

**Internal consistency:** indicates whether all subparts of an instrument measure the same characteristic. It is one of the criteria that guarantee reliability, hence, low internal consistency can represent inconsistency when measuring what has been proposed<sup>13</sup>. Cronbach's alpha coefficient was used to evaluate internal consistency with questions being grouped in each domain. The following parameters were considered: 0.70-0.90: adequate; and >0.95: redundant questions<sup>18</sup>.

**Test-retest reliability:** it is used to evaluate the stability of the instrument. It is considered adequate when similar results are obtained by applying the test at two distinct moments after a lapse of time between the applications. Like internal consistency, it is part of the criteria that ensure reliability<sup>13</sup>. For this analysis, the Spearman correlation coefficient ( $r$ ) was used. Test-retest reliability is considered strong when  $r$  is greater than or equals 0.67<sup>19</sup>.

**Criterion validity:** it is the ability of an instrument to measure exactly what it proposes to measure<sup>13</sup>. For this study, the validity of convergent and divergent criteria was used. As an assumption, we established the relational hypothesis between the domains of the WHODAS 2.0 with the domains of the WHOQoL-BREF and the WHOQoL-OLD to test convergent and divergent validity, as shown in Table 1. There is a strong relationship between the WHOQoL and the WHODAS 2.0<sup>8</sup>. Both were designed by the WHO and have their constructions interconnected; however, the WHODAS 2.0 evaluates functioning<sup>9</sup> measurements while the WHOQoL evaluates subjective well-being measurements<sup>16,17</sup>. No other validated instrument is known to assess domains similarly to the WHODAS 2.0. In the lack of a "gold standard" instrument, it is possible to test convergent validity by correlating the scores of the focal instrument with the scores of another instrument that evaluates a similar construct<sup>13</sup>. In this case, the domains of each of the instruments are not identical, but they correlate and are similar, thus the inferences of convergent and divergent validity are favored.

Table 1. Correlational hypothesis between the the WHODAS domains and the WHOQoL-bref and WHOQoL-old domains

WHODAS 2.0	WHOQoL-BREF	WHOQoL-OLD	Expected relationship
Cognition	Psychological	Autonomy	Convergent
	Social relations	Past, Present and Future Activities	Divergent
Mobility	Physical	Sensory abilities	Convergent
	Social relations	Death and dying	Divergent
Self-care	Physical	Autonomy	Convergent
	Environment	Intimacy	Divergent
Getting along	Social relations	Social participation	Convergent
	Psychological	Sensory abilities	Divergent
Life activities	Physical	Autonomy	Convergent
	Social relations	Intimacy	Divergent
Participation	Environment	Social participation	Convergent
	Intimacy	Death and dying	Divergent

The Spearman's correlation coefficient was used for this measurement property, where:  $r=0.10$  to  $0.39$ : weak correlation;  $r=0.40$  to  $0.69$ : moderate correlation;  $R \geq 0.70$ : strong correlation<sup>19</sup>.

### Statistical analysis

The following descriptive measures were used to describe the clinical, sociodemographic and functional characteristics of the study participants: measures of central tendency (mean) and dispersion (standard deviation). Data distribution was verified with the Shapiro-Wilk test. Internal consistency was assigned according to Cronbach's alpha resulting from analysis of the WHODAS 2.0 domains. Test-retest reliability was analyzed by the Spearman's correlation test between the domain values and the WHODAS 2.0 total found in the test-retest. Spearman's correlation test was used to evaluate the criterion validity between the domains and total score of the WHODAS 2.0 and the WHOQoL-BREF and WHOQoL-OLD questionnaires.

Statistical analyses were performed using the Stata 13 software. Statistical significance level of  $p < 0.05$  was used.

## RESULTS

### Sample characterization

There were 290 eligible older adults for this study. Out of these, 103 refused to participate; 34 had severe functional impairment; nine presented communication impairment; seven presented hearing impairment; 31 did not reach the expected cut-off point, which revealed cognitive impairment; and six individuals were excluded because they did not reapply after seven days (due to withdrawal, worsening of general condition or death). However, it was possible to obtain the sample of 100 participants.

The participants were predominantly male (54) with a mean age above 70 years (74.7). Regarding schooling: 20 were illiterate (MMSE=20.05), 37 had one to three years of schooling (MMSE=23.62), 31 had four to seven years (MMSE=24.7), 10 had eight to ten years (MMSE=26.4) and two individuals had more than 11 years of schooling (MMSE=29). Among the domains of the WHODAS, the one in which the participants presented the highest score was “mobility.” The domains in which they had the lowest scores and, consequently, presented lower quality were “environment” in the WHOQoL-BREF, as well as “intimacy” in the WHOQoL-OLD. The other characteristics are recorded in Table 2.

Table 2. Description of the study sample

Characteristic	n (100)	
Gender		
Male	54	
Female	46	
Marital Status		
Never married	32	
Currently married	6	
Separated	7	
Divorced	23	
Widower	32	
Work activity		
Retired	98	
Others	2	
	Mean	Standard Deviation
Age group	74.77	9.77
Years of schooling	3.72	2.96

(continues)

Table 2. Continuation

Characteristic	n (100)	
WHODAS 2.0 (36-item version)		
Cognition	24.2	22.45
Mobility	42.06	32.56
Self-care	22	25.89
Getting Along	24.83	24.38
Life activities (domestic)	16.20	15.40
Participation	30.41	21.87
TOTAL	30.36	19.71
WHOQoL-bref		
Physical	59.16	18.77
Psychological	60.20	18.87
Social relations	55.33	19.45
Environment	54.30	17.58
TOTAL	57.25	14.09
WHOQoL-old		
Sensory abilities	66	25.25
Autonomy	47.53	21.11
Past, present and future activities	58.68	20.56
Social participation	57	18.59
Death and dying	73.37	24.30
Intimacy	40.24	28.14
TOTAL	57.13	15.19

### Measurement properties

Table 3 presents the results of internal consistency and test-retest reliability. To assess internal consistency, Cronbach's alpha ranged from 0.75 to 0.94 between the analyses of its domains, demonstrating satisfactory internal consistency. The lowest IC value was found in the “Getting Along” domain; subsequently, this measurement property was analyzed when the question regarding sexual activity was excluded. A higher Cronbach's alpha coefficient was thus obtained (0.79). Furthermore, Spearman's correlation coefficients were calculated to examine test-retest reliability. Their analysis verified strong stability in all areas of the WHODAS 2.0 ( $\geq 0.81$ ), with mobility ( $r=0.90$ ), self-care ( $r=0.91$ ), and life activities ( $r=0.89$ ) standing out as the highest values. These results indicate good reliability when using the instrument for the population of institutionalized older adults.

Table 3. Distribution of Cronbach's Alpha coefficient and Spearman's correlation coefficient according to the WHODAS 2.0 domains

WHODAS 2.0 (domain) <sup>*</sup>	Internal Consistency (Cronbach's alpha)	Test-retest Reliability (r)
Cognition	0.83	0.86
Mobility	0.89	0.90
Self-care	0.76	0.91
Getting Along	0.75	0.81
Life activities (domestic)	0.94	0.89
Participation	0.81	0.85
TOTAL	0.93	0.95

IC: internal consistency; r: Spearman's correlation coefficient.  
<sup>\*</sup> domains for school or work activities were not analyzed.

Table 4 shows the correlation coefficients for the WHODAS 2.0 domains, and the domains of the other instruments, alongside their respective levels of statistical significance. As for convergent and divergent

criterion validations, the correlations were  $r=0.40$  to  $0.68$ ;  $p<0.0001$  and  $r=0.19$  to  $0.38$ ;  $p=0.0001$  to  $p=0.004$ , respectively.

## DISCUSSION

The WHODAS is a translated and adapted instrument that shows consistency in assessing functioning and disability following the model proposed by the ICF<sup>8</sup>. Despite the abundance of tools to assess functioning in several health conditions, there were few instruments for assessing the functioning of institutionalized older adults that included the domains of health condition, body function and structure, and personal factors<sup>10</sup>, following the ICF proposal. The purpose of this study was to analyze some measurement properties of the Brazilian 36-item version of the WHODAS 2.0 in institutionalized older adults.

Table 4. Matrix of the correlation coefficient between the WHODAS 2.0, WHOQoL-BREF and WHOQoL-OLD domains

Instrument/ domain	WHODAS 2.0 / domains						
	Cognition	Mobility	Self-care	Getting Along	Life activities	Participation	Total
<i>WHOQoL-BREF</i>							
Physical	<b>-0.45*</b>	<b>-0.52*</b>	<b>-0.57*</b>	<b>-0.48*</b>	<b>-0.46*</b>	<b>-0.64*</b>	<b>-0.69*</b>
Psychological	<b>-0.49*</b>	-0.19	-0.33 <sup>†</sup>	-0.32 <sup>†</sup>	-0.31 <sup>†</sup>	<b>-0.51*</b>	<b>-0.46*</b>
Social relations	-0.25 <sup>†</sup>	-0.22 <sup>†</sup>	-0.14	-0.34 <sup>†</sup>	-0.38 <sup>†</sup>	-0.37 <sup>†</sup>	-0.39 <sup>†</sup>
Environment	-0.28 <sup>†</sup>	-0.11	-0.17	-0.27 <sup>†</sup>	-0.10	<b>-0.49*</b>	-0.34 <sup>†</sup>
Total	<b>-0.48*</b>	-0.33 <sup>†</sup>	<b>-0.40*</b>	<b>-0.46*</b>	<b>-0.40*</b>	<b>-0.66*</b>	<b>-0.62*</b>
<i>WHOQoL-OLD</i>							
Sensory abilities	<b>-0.46*</b>	<b>-0.41*</b>	-0.30 <sup>†</sup>	-0.38 <sup>†</sup>	-0.27 <sup>†</sup>	<b>-0.43*</b>	<b>-0.50*</b>
Autonomy	<b>-0.40*</b>	-0.20 <sup>†</sup>	-0.16	-0.33 <sup>†</sup>	-0.21 <sup>†</sup>	<b>-0.45*</b>	<b>-0.40*</b>
Past, present and future activities	-0.24 <sup>†</sup>	-0.20 <sup>†</sup>	-0.12	-0.37 <sup>†</sup>	-0.27 <sup>†</sup>	<b>-0.43*</b>	-0.35 <sup>†</sup>
Social participation	-0.27 <sup>†</sup>	<b>-0.51*</b>	-0.25 <sup>†</sup>	<b>-0.44*</b>	-0.31 <sup>†</sup>	<b>-0.58*</b>	<b>-0.57*</b>
Death and dying	-0.19 <sup>†</sup>	-0.11	-0.22 <sup>†</sup>	-0.24 <sup>†</sup>	-0.26 <sup>†</sup>	-0.37 <sup>†</sup>	-0.30 <sup>†</sup>
Intimacy	-0.21 <sup>†</sup>	-0.26 <sup>†</sup>	-0.12	-0.22 <sup>†</sup>	-0.36 <sup>†</sup>	-0.23 <sup>†</sup>	-0.33 <sup>†</sup>
Total	<b>-0.44*</b>	<b>-0.42*</b>	-0.28 <sup>†</sup>	<b>-0.48*</b>	<b>-0.42*</b>	<b>-0.61*</b>	<b>-0.61*</b>

<sup>†</sup>  $p<0.05$  (Spearman's correlation test); bold: moderate/significant correlation.

The results of this study showed satisfactory measurement properties, which allow the use of the tool to assess and to monitor the functioning of institutionalized older adult. Although it is not the objective of this study, when comparing the domains, "mobility" presented a higher score, indicating that this population experiences greater difficulty

therein, which converges with other studies involving institutionalized older individuals and which reveal loss in locomotion and the high risk of falls as the most present changes in these older adults<sup>3</sup>. Thus, the significance of the WHODAS 2.0 in the assessment of functioning of institutionalized older adults is re-emphasized.

Regarding the measurement properties, our main objective, values that determine good internal consistency were found in all domains and in the total value of the WHODAS 2.0. In two Brazilian validation studies in subjects with chronic obstructive pulmonary disease<sup>11</sup> and in people with chikungunya<sup>20</sup>, similar values were obtained, with Cronbach's alpha ranging from 0.72 to 0.89 in the domains and 0.85 to 0.97 in the total value.

Strong test-retest reliability was also found in all domains, measuring stability when applied at different times. The values corroborate the findings of the study by Santos et al.<sup>21</sup>, a Brazilian study of validation of the WHODAS for the population with fibromyalgia which obtained values  $r=0.64-0.94$ <sup>21</sup>, in addition to the values found in the research by Silveira et al.<sup>22</sup>, a Brazilian validation study for the population with blindness that presented a range of  $r$  values between 0.64 and 0.94 for test-retest reliability<sup>22</sup>.

When analyzing the domain "Getting Along" the results for internal consistency and test-retest reliability of this domain were lower compared to the same properties of other domains, although within the appropriate values that guarantee reliability. During the interviews, most participants expressed dissatisfaction regarding socialization and Getting Along, which corroborates what was found in the literature in a study also conducted with institutionalized older adults<sup>1</sup>. Some participants reported difficulty answering the question regarding sexual activity. When assessing internal consistency without the aforementioned question, the results indicated a higher value for Cronbach's alpha (0.79). This finding corroborates the study by Ćwirlej-Sozańska et al.<sup>23</sup>, which, when evaluating the theoretical validity of the questions by estimating the items that compose the domains for the population of older adults non-residents of LSIE, found a lower result in the item regarding sexual activity, which may account for the lower internal consistency found in this study, and which may have favored greater variation in the test-retest score.

The test-retest reliability of the "self-care" domain remained one of the highest, which ensures stability. However, its internal consistency, although adequate, was lower compared to other domains. For example, the item that addresses "food," in all LSIE where the questionnaires were applied, food was prepared and served even to those older adults who were physically and

cognitively fit to serve themselves. However, dependent or not, the participants chose a lower degree of difficulty in their answers since they were performed without difficulties. This may account for the relatively low difficulty score (mean=22; SD=25.89), followed by lower internal consistency and high test-retest reliability. In a Brazilian validation study for the population with HIV/AIDS, internal consistency was obtained below the appropriate parameters in this same domain (0.32), in which test-retest reliability was not analyzed<sup>24</sup>.

In the analysis of convergent and divergent validity, only values of negative correlation coefficients were found. This occurred because the instruments utilized for data analysis have inverse scores. Regarding the intensity of the coefficient relationship, only moderate correlations were identified between the instruments, the same result found in other studies that also used the WHOQoL-BREF<sup>22,25</sup>. In a study conducted in Poland with older adults (aged 60 to 70) using the same instrument to support criterion validity, the highest correlation when correlating domains was 0.73<sup>23</sup>. We found a lower value in our study, but close to values of other studies with the same objective<sup>20,25</sup>. In the validation study of the WHODAS for use in post-chikungunya patients<sup>20</sup>, a strong correlation was obtained of the total value of the WHODAS with the "physical" domain of the WHOQoL-BREF; in our study, a moderate correlation was obtained ( $r=-0.69$ ), the same value found in other studies with the Brazilian population<sup>22,25</sup>. No other published study used the WHOQoL-OLD for analysis of the criterion validity of the WHODAS instrument.

The "mobility," "self-care" or "life activities" domains of the WHODAS were expected to have at least moderate correlation with the "autonomy" domain of the WHOQoL-OLD. However, the four issues concerning "autonomy" are related to freedom to make decisions and to do what one likes, and to the ability to control the future<sup>16</sup>, while the "mobility" domain of the WHODAS assesses difficulty in activities such as standing up, moving, leaving the house and long-distance walking. On the other hand, "self-care" assesses items such as handling one's own personal hygiene, getting dressed, eating, and staying alone; and finally, "life activities" approaches domestic responsibilities<sup>9</sup>. These findings may justify the weak correlations between "autonomy" and "mobility," "self-care," and "life activities" since both instruments approach the

aforementioned domains differently. Notably, the “autonomy” domain of the WHOQoL-OLD obtained moderate correlation with the “cognition” domain of the WHODAS. “Cognition” assesses understanding and communication, variables that interfere with one’s decision-making skills and, consequently, with one’s ability to command one’s actions, that is, to maintain one’s autonomy<sup>2</sup>, another finding that justifies the validity of the instrument assessed here.

When analyzing the “Getting Along” domain of the WHODAS, we obtained moderate correlation with the “social participation” domain of the WHOQoL-OLD and weak correlation with the “social relations” domain of the WHOQoL-BREF. In Brazilian studies of WHODAS validation that adopted the WHOQoL-BREF for criterion validity, moderate correlation was obtained by correlating these domains for the population with chikungunya<sup>20</sup>. However, both in the validation work for hemodialysis patients<sup>25</sup> and for people with blindness<sup>22</sup>, only weak correlations were reported. Although very similar in their assessments, the WHOQoL-BREF analyzes how the individual feels in the present time regarding their personal relationships, social support, and sexual activity<sup>16</sup>; on the other hand, the WHODAS assesses the difficulty of an individual to interact with other people in the last 30 days<sup>9</sup>, which may account for the weak correlation.

Other correlations were found to support convergent validity. Castro et al.<sup>25</sup> validated the 36-item version of the WHODAS in hemodialysis patients using the WHOQoL-BREF in their analysis and, as in our study, found moderate correlations of the total value of the WHODAS with the total values of the other two instruments used to ensure convergent validity. Note that, some studies use the quality of life assessment instrument Medical Outcomes Study 36-Item Short-Form Health Survey (SF-36) to analyze their criterion validity, as in the study by Garin et al.<sup>12</sup>. In this study, the measurement properties of the WHODAS 2.0 were assessed for patients from seven centers in Europe with different chronic conditions. The authors found moderate correlations ( $r=-0.63$ ), with the sole exception of the “mobility” domain, which obtained a strong correlation ( $r=-0.75$ ) with the “functional capacity” domain of SF-36. This was also found in the study of patients with fibromyalgia that used SF-36 in the analysis and obtained a strong correlation with the “mobility” domain ( $r=-0.72$ ), followed by moderate correlations with the

other domains ( $r=-0.69$ )<sup>21</sup>. Generally, similar results were found for convergent validity using these two instruments. To support divergent validity, we obtained results that indicate that those domains that should diverge from each other obtained weak correlations. Similar results were reported in the validation study for people on hemodialysis, which assessed divergent validity in a similar way<sup>25</sup>.

As a limitation of the study, we can highlight the fact that data collection was carried out in two distinct periods, from 2016 to 2017 and in 2019, and the inability to conduct the research in only one location, since we did not find the number of eligible older adults in a single institution. However, the collection reached 100 participants, which allowed us to obtain a 95% confidence interval for instrument validation<sup>14</sup>. Still, although the instrument is stable and reliable in its general assessment, we have found the need for planning and care in using the question regarding sexual activity when interviewing this population. Only moderate correlations were found to support convergent criterion validity. Such correlations were expected, since both communicate and converge with each other, but assess similar constructs differently<sup>9</sup>. Furthermore, most studies using the SF-36 instrument also obtained moderate correlations. However, other strategies could have been used, such as a concurrent application of the subjective well-being questionnaire (WHOQoL) with other tools that assess functional capabilities, such as the Lawton and Brody scale and the functional independence measure (FIM), which could be correlated with the domains of self-care and life activities, or the timed up and go (TUG), which could be correlated with the mobility domain.

It should be noted that this study provides a generic tool with its tested and consistent measurement properties based on the ICF that aims to assess functioning in people with various health conditions and disabilities. The availability of this tool will allow its use in the academic field and it may be incorporated into the clinical practices of health professionals, assisting in the follow-up of older adults throughout the length of institutionalization and offering a more comprehensive and targeted approach to care. Furthermore, this study makes it possible to use functioning as a health indicator for this population. This construct could not be measured until now because there were no tools to perform this approach following the biopsychosocial model.

## CONCLUSION

This study demonstrated appropriate measurement properties (internal consistency, test-retest reliability, validity of convergent and divergent criteria) of the WHODAS, which makes it valid and reliable for assessing changes in functioning in institutionalized elderlies.

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