Validity and reliability of the Brazilian version of the World Health Organization Disability Assessment Schedule in blind people

Validade e confiabilidade da versão brasileira do World Health Organization Disability Assessment Schedule em pessoas com cegueira

Validez y confiabilidad de la versión brasileña de la World Health Organization Disability Assessment Schedule en personas con ceguera

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ABSTRACT | The World Health Organization Disability Assessment Schedule (WHODAS 2.0) is a tool developed by the World Health Organization (WHO) to measure functioning and disability, supporting the ICF model. The Brazilian version of WHODAS 2.0 was translated and made available for use by WHO in 2015. Thus, this study aims to validate the Brazilian version of WHODAS 2.0 for use in blind people. Participants were 56 blind people (mean age: 48.4 ± 13.6) years. Two assessment tools were used, the 36-item version of WHODAS 2.0 and the World Health Organization Quality of Life-BREF (WHOQOL-bref). The psychometric properties tested were internal consistency, test-retest and criterion validity. There was good test-retest reliability (ICC≥0.63). Cronbach's alpha values showed good internal consistency in most areas, except in the subdomain of school or work activities (α = 0.55). The validity criterion was adequate, with moderate correlations between WHODAS 2.0 domains and WHOQOL-bref areas. The results indicated the validity of the WHODAS 2.0 for assessing the functionality of blind people.

RESUMO | O *World Health Organization Disability Assessment Schedule* (WHODAS 2.0) é uma ferramenta desenvolvida pela Organização Mundial de Saúde (OMS) para medir deficiência e incapacidade, apoiando o modelo da Classificação Internacional de Saúde, Incapacidade e Funcionalidade. A versão brasileira do WHODAS 2.0 foi traduzida e disponibilizada para uso pela OMS em 2015. Assim, este estudo pretende validar a versão brasileira do WHODAS 2.0 para uso em pessoas com cegueira. Participaram 56 pessoas com cegueira (idade média: 48,4±13,6 anos). Foram utilizadas duas ferramentas de avaliação: a versão de 36 itens do WHODAS 2.0 e o *World Health Organization Quality of Life-bref* (WHOQOL-abreviado). As propriedades psicométricas testadas foram consistência interna, teste-reteste e validade de critério. Houve boa confiabilidade teste-reteste (ICC≥0,63). Os valores de α de Cronbach mostraram boa

The study was based at the Federal University of the Triângulo Mineiro, and collections were carried out in Uberaba, Uberlândia and Ribeirão Preto

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consistência interna na maioria das áreas, exceto no subdomínio de atividades escolares ou de trabalho (α=0,55). A validade do critério foi adequada, com correlações moderadas entre os domínios do WHODAS 2.0 e áreas do WHOQOL-abreviado. Os resultados indicaram a validade do WHODAS 2.0 para avaliar a funcionalidade de pessoas com cegueira.

Descritores | Avaliação da Deficiência; Estudos de Validação; Psicometria; Cegueira.

RESUMEN | La *World Health Organization Disability Assessment Schedule* (WHODAS 2.0) es una herramienta desarrollada por la Organización Mundial de la Salud (OMS), la que se utiliza para medir la discapacidad y la incapacidad, basándose en el modelo de la Clasificación Internacional del Funcionamiento de la Discapacidad y de la Salud. La versión brasileña de WHODAS 2.0 fue traducida por la OMS y puesta a disposición para su uso en 2015. Este estudio pretende validar la versión brasileña de WHODAS 2.0 para uso en personas con ceguera. Participaron 56 personas con ceguera (promedio de edad: 48,4±13,6 años). Se utilizaron dos herramientas de evaluación: la versión de 36 ítems de WHODAS 2.0 y la *World Health Organization Quality of Life-bref* (WHOQOL-abreviado). Las propiedades psicométricas probadas fueron: consistencia interna, test-retest y validez de criterio. Hubo una buena confiabilidad test-retest (ICC≥0,63). Los valores de α de Cronbach mostraron una buena consistencia interna en la mayoría de las áreas, excepto en el subdominio de actividades escolares o de trabajo (α=0,55). La validez del criterio fue adecuada, con correlaciones moderadas entre los dominios de WHODAS 2.0 y las áreas de WHOQOL-bref. Los resultados demuestran la validez de WHODAS 2.0 para evaluar la funcionalidad de las personas con ceguera.

Palabras clave | Evaluación de la Discapacidad; Estudios de Validación; Psicometría; Ceguera.

INTRODUCTION

Visual impairment is the result of a loss of vision caused by disease or other factors, resulting in a change in visual function. The term "blindness" is not an absolute term, since individuals can be grouped according to different degrees of residual vision. This type of disability leads to limitations that may incapacitate the performance of daily tasks[1].

Vision is considered to be a major facilitator of the integration between motor, perceptual and mental activities for individuals[2] and, since the subject has a significant deprivation in this sensory function, functional limitations may occur. Blindness imposes limits that require adaptation and, according to the society we live in, differences are considered a disadvantage. However, a blind person, although disabled, has the same developmental capacity as any other person, provided adequate conditions are satisfied[3].

With the proposal to provide and encourage the use of an explanatory model of functionality that includes biopsychosocial aspects, the World Health Organization (WHO) published the International Classification of Functioning, Disability and Health (ICF), which identifies disability as "problems in functions or structures of the body, such as significant deviation or loss"[4]. As part of the effort to disseminate the use of ICF, the WHO developed a generic assessment tool to measure health and disability in all cultures based on the ICF, called the *World Health Organization Disability Assessment Schedule* (WHODAS 2.0), using less items, therefore reducing the time required and allowing administration to be more flexible without departing from the model proposed by it[5].

WHODAS 2.0 has been successfully applied in population and clinical settings in a variety of different cultures, as can be seen in the study by Federici et al. [6]. These authors published a review of the international literature about WHODAS focusing on studies that evaluated its psychometric properties, selecting 54 studies since the publication of the instrument in 1988 up until 2008. Of these, only eight tested the psychometric properties of the instrument.

In 2015, WHODAS 2.0 was translated into Brazil by Castro and Leite[7], with it being the official version recognized by WHO. To date, this research is the first study where the psychometric properties of the Brazilian version of WHODAS 2.0 were investigated in the specific group of blind people.

The WHODAS 2.0 is a validated instrument for blind people and can guide the integration of these people into social environments, as well as providing a reliable instrument for assessing functionality. Researchers and clinicians may obtain more appropriate measures of functional *status* consistent with a biopsychosocial approach, as recommended by WHO. With regard to public health, this study will identify an appropriate and reliable tool for assessing health and disability, facilitating the prioritization, outcome analysis and

evaluation of effectiveness and performance in the health systems.

The objective of this study was to analyze the psychometric properties of the Brazilian version of WHODAS 2.0 for use in blind people.

METHODOLOGY

This research is characterized as a validation study. This study was approved by the Ethics Committee of the Federal University of Triângulo Mineiro (Opinion No. 948.994/2015). Participants signed a Consent Form, which was read out loud or provided in Braille for readers of this modality.

Local data collection was done by research of institutions working with the visually impaired within 200 kilometers of the region of Triângulo Mineiro in Brazil, comprising the cities of Uberaba and Uberlândia (MG) and Ribeirão Preto (SP).

The participants had to prove the diagnosis of congenital or acquired blindness by means of an ophthalmic report. To ensure a minimum level of cognition and understanding of the content of the instruments used, the Mini Mental State Examination (MMSE) was applied[8] with the following adaptations in order to accommodate its execution by the blind individual: the item requiring the drawing of a pentagon has been changed to create its geometric shape using wooden sticks; the reading item was changed to read a Braille phrase; and the item appointed by visual identification was changed to tactile identification.

The cut-off scores of the participants would guarantee a greater specificity of the test (<20 for those who were illiterate, 25 for individuals with 1 to 4 years of schooling, 26.5 for participants with 5 to 8 years of schooling, 28 for 9 to 11 years of education and 29 for participants with more than 11 years of schooling). The implementation of these values was guided by another study[9], and they have been frequently used in epidemiological studies[10-12].

Participants were excluded who had a medical diagnosis of secondary diseases or disorders that interfere with functionality, such as cardiorespiratory, circulatory, neurological, mental and/or auditory diseases, as well as those with orthopedic problems.

Of the 110 medical records provided by the institutions, data from 35 people were outdated. The remaining 75 people were contacted, of which 19 refused to participate or were excluded due to MMSE values below the cutoff

point or to presence of secondary diseases. A total of 56 blind people attested by ophthalmic report participated in the study.

For this research, two evaluation instruments were used: WHODAS 2.0, with its 36-item version, and *World Health Organization Quality of Life-Bref* (WHOQOL-bref), both applied in interview form. To conduct the study, the interviewers underwent training in order to avoid possible differences in the application of the instrument.

According to the WHODAS 2.0[5,13] application manual, during the interview respondents are asked about the degree of difficulty they experience when doing different activities. Possible responses are: (1) none, (2) mild, (3) moderate, (4) severe and (5) extreme or unable to do.

The questions are divided into six domains. Domain 1 (cognition) asks questions about communication and thinking activities. Domain 2 (mobility) discusses activities such as standing, walking indoors, going out and walking long distances. Domain 3 (self-care) asks about bathing, dressing, eating and being alone. Domain 4 (interpersonal relations) assesses the difficulties that can be encountered when dealing with other people. In this context, "people" may be those with whom the respondent is well acquainted or intimate with (for example, spouse or partner, family or close friends), or those who the respondent does not know (e.g. strangers). Domain 5 (life activities) includes questions about difficulties in everyday activities. Finally, domain 6 (participation) represents a change in the line of questioning used in the first five domains. Here they are reporting not their limitations on activities, but rather the restrictions they experience because of people, laws and other aspects of society in which they find themselves[5].

Two response cards are used in the modality administered by interviewers. The purpose of response cards is to provide a tip or visual reminder to the respondent about important information while answering the questions[5].

Response card No. 1 offers information about health conditions (illness, illness, injury, mental or emotional problems, alcohol or drug problems) and what one considers to be difficulties (increased exertion, discomfort or pain, slowness, changes in the way of performing the activity). At this point, the rater comments to the respondent that he should consider the last 30 days before the interview. As the population of this study is comprised of blind people, verbal reinforcement was used to replace this card.

Response card No. 2 offers a response scale to be used for most questions. The number and the corresponding word should be read aloud. Respondents can point to their response on the scale or offer verbal response, although the latter is preferable. A tactile information card was adapted for the respondents (sandpaper of different weights) and/or a Braille card was used to replace the original (Figure 1). The adapted scheme of the response card No. 2 was made based on the sensory experience of a blind subject who, based on the pilot study, chose different weights, ensuring that they differed gradually.
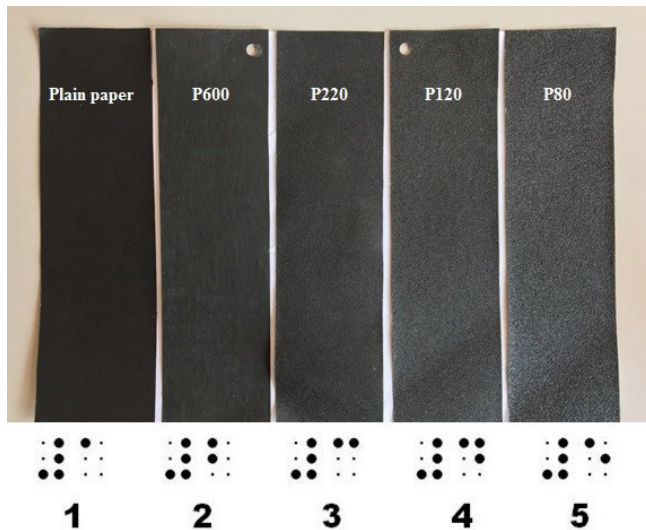

Figure 1. Adapted response card No. 2

The WHOQOL-bref was developed by the WHO Quality of Life group due to the need for an instrument that required less time than the WHOQOL-100 for its application, maintaining satisfactory psychometric characteristics for the measurement of quality of life[12].

The WHOQOL-bref is constituted by 26 questions, two general quality of life issues and the other 24 issues divided into four domains: physical, psychological, social relations and environmental. It was validated for Brazil in 2000[12].

All questions are presented as a five-point Likert scale: the closer to 1, the worse the quality of life, and the closer to 5, the better the quality of life, except for items q3 (physical pain), q4 (treatment) and q26 (negative feelings), with an reverse score[14].

According to the WHODAS manual, the concepts of quality of life (WHOQOL) and functionality (WHODAS) are interrelated. The instrument able to attribute functioning works with the objective performance of the subject in a given domain of life, whereas the WHOQOL works with the subjective assessment of well-being (subjective satisfaction assessment in a given domain of life)[5,13]. Ideally, the same domains should be used in both instruments. However, while one verifies what the person "does" in one particular domain of life (WHODAS), the other works with what one feels in that particular domain (WHOQOL). As described, it is possible to consider WHOQOL as the best instrument to date for criterion validation.

Validation

Score variables (total and per domain) from both tools (WHODAS and WHOQOL-bref) were used in the validation process. The data were analyzed using the application *software* Stata version 13. Table 1 presents information on the psychometric properties examined in this study.

For criterion validity, the value of r is always between -1 and +1, with r=0, corresponding to no association. Negative r values indicate reverse associations, whereas positive values indicate directly proportional associations. The higher the value of r (positive or negative), the stronger the association[17].

The methods used to validate the internal consistency and criterion validity depend on a single application of the instrument in the studied group. However, for test-retest there is a need for two evaluations. Therefore, WHODAS 2.0 was administered twice among participants, with a seven day interval between each administration, and using the same rater for data collection.

The time interval between the two measures was determined based on a 2003 study by Üstün[17], one of the collaborators in the creation of WHODAS 2.0, which used seven days between evaluations. For the first evaluation, all evaluation instruments were applied: MMSE, WHODAS 2.0 and WHOQOL-bref. The subsequent evaluation date was scheduled at the first meeting with each participant. Data collection took place from June to November 2015.

Convergent and divergent validations were tested using the Spearman correlation coefficient. As an *a priori* hypothesis, we consider to have a convergent relationship: the mobility domains of WHODAS 2.0 and the physical domain of the WHOQOL-bref; interpersonal relationships (WHODAS 2.0) and psychological domain (WHOQOL-bref); as well as the total scores of both tools. We consider the cognitive domain of WHODAS 2.0 to be divergent from the domain of social relations as well as the domain of the WHOQOL-bref environment.

Table 1. Psychometric properties analyzed, objectives, tests and reference values

Psychometric property	Objective	Tests	Reference Values
Internal consistency	Verify if the various items proposed to measure the same general construct produce similar results.	Cronbach's Alpha	α between: 0.70 and 0.90 adequate internal consistency; >0.95 redundant items[14]
Test-retest reliability	Verify the stability of the instrument in two measurements carried out at different periods.	Intraclass correlation coefficient and Spearman correlation test	Coefficient between: 1.0 and 0.81 excellent; 0.80 and 0.61 very good; 0.60 and 0.41 good; 0.40 and 0.21 reasonable; 0.20 and 0.00 poor reliability[15]
Inter-rater reliability	Verify if the measurements or observations made by different raters are concordant under the same conditions.		
Convergence criterion validity	Verify the relationship that the instrument to be validated has with another instrument.	Correlation coefficient	Coefficient: above 0.70 strong/high; 0.40 to 0.69 moderate; 0.39 to 0.10 weak/low association[16]
Validity of discriminant criteria	Verify the non-correlation of the instrument content to be validated with domains or non-correlated fields of other instruments.		

RESULTS

Sample characteristics

Fifty-six people participated in the study, with a mean age of 48.4 (±13.6) years, of which 62.5% were male. Most of the participants were single (42.9%), followed by people with stable union (37.5%), divorced (12.5%) and widows (7.1%).

Regarding the profession, 66% of the participants were retired, 5% were students and 29% were in the "other" option, which involved people with some related kind of occupation (paid or voluntary) and pensioners, among others.

Table 2 shows the characterization of the sample according to the blindness diagnosis, with a predominance of acquired etiology (80%).

The means and standard deviations (SD) of the WHODAS 2.0 domains were: for cognition, 26.51 (±21.42); for mobility, 21.98 (±23.50); for self-care, 10.0 (±18.68); for interpersonal relationships, 19.94 (±20.88); for home life activities, 5.86 (±12.71) and for school/work, 26.78 (±28.29); for participation, 31.91 (±19.72); and overall, 22.05 (±14.66). The values for the WHOQOL-bref domains were: 65.30 (±17.46) for the physical domain; for psychological, 68.15 (±16.05); for social, 67.11 (±20.43); for environmental, 58.14 (±15.61); and total 64.68 (±13.47). MMSE showed 25.12 (±3.75).

Table 2. Sample characterization according to etiology

Etiology	n (%)	Congenital	Acquired
Retinitis Pigmentosa	13 (23%)	0	13
Glaucoma	10 (18%)	2	8
Retinal Detachment	5 (9%)	0	5
Optic Nerve Atrophy	4 (7%)	1	3
Congenital Malformation	4 (7%)	4	0
Unable to inform	4 (7%)	1	3
Injury/trauma	3 (5%)	0	3
Cancer	3 (5%)	0	3
Diabetic Retinopathy	3 (5%)	0	3
Toxoplasmosis	2 (4%)	0	2
Iatrogeny	2 (4%)	1	1
Retinopathy of Prematurity	2 (4%)	2	0
Keratoconus	1 (2%)	0	1
Total	**56 (100%)**	**11 (20%)**	**45 (80%)**

Validation of WHODAS 2.0

The answers to the 36 questions were statistically verified for each domain and organized into tables. Table 3 shows the results for internal consistency (IC) and test-retest reliability.

Table 3. Distribution of validation coefficients according to WHODAS 2.0 domains

WHODAS 2.0	n	IC Cronbach's α	Test-Retest ICC (CI 95%)	R
Cognition	56	0.78	0.59 (0.32-0.87)	0.75*
Mobility	55	0.73	0.78 (0.58-0.99)	0.90*
Self-care	51	0.79	0.85 (0.65-0.99)	0.79*
Interpersonal Relationships	52	0.65	0.73 (0.47-0.98)	0.76*
Domestic Activities	55	0.87	0.63 (0.31-0.95)	0.73*
School or Work Activities	18	0.22	0.50 (0.02-0.98)	0.93*
Participation	55	0.74	0.63 (0.40-0.86)	0.85*
Total	16	0.88	0.73 (0.54-0.92)	0.90*

*: p <0.05; n: number of people who answered all questions of each domain; n total: number of people who answered all questions from WHODAS 2.0; IC: internal consistency; ICC: intraclass correlation coefficient; 95% CI: 95% confidence interval; r: Spearman correlation coefficient.

In the internal consistency test, the Cronbach's *a* coefficient for each domain ranged from 0.22 to 0.87. For the total score, Cronbach's *a* was 0.88. These values suggest that the scale has adequate internal consistency for most of the research objectives.

The test-retest reliability was considered good (ICC≥0.63) in most areas except the cognitive domain (ICC=0.59) and the subdomain of the school or work activities (ICC=0.50), which also demonstrated a greater confidence interval (0.02 to 0.98). The confidence interval with wide variation reinforces the low significance of reliability in this domain. The ICC analyzes the equality between responses and, since the scale has five alternatives, Spearman's correlation coefficients were calculated to examine the relationship between the instrument domains. The analysis verified high reliability in all areas of WHODAS 2.0 (≥0.73).

In Table 4, presenting the results for the validity of the convergent and divergent criteria, we examined the correlations between the WHODAS 2.0 areas with WHOQOL-bref areas.

Table 4. Distribution of correlation coefficients between WHODAS 2.0 and WHOQOL domains

WHODAS 2.0 – Domains								
	1	2	3	4	5.1	5.2	6	Total
WHOQOL								
PD	-0.44*	-0.60*	-0.33*	-0.43*	-0.40*	-0.01	-0.53*	-0.62*
PSD	-0.28*	-0.30*	-0.24	-0.48*	-0.33*	-0.02	-0.43*	-0.47*
SD	-0.18	0.03	-0.16	-0.22	-0.34*	-0.06	-0.24	-0.25
ED	-0.29*	-0.24	-0.18	-0.29*	-0.27*	-0.16	-0.34*	-0.40*
Total	-0.37*	-0.34*	-0.32*	-0.48*	-0.45*	-0.09	-0.49	-0.56*

*: p<0.05; in bold: moderate/significant correlation; WHODAS 2.0 Domains: (1) cognition, (2) mobility, (3) self-care, (4) interpersonal relationships, (5.1) household activities, (5.2) school or work activities, (6) participation; PD: physical domain; PSD: psychological domain; SD: social domain; ED: environmental domain.

The negative values of r were demonstrated in most associations. This occurred due to WHODAS 2.0 and WHOQOL-bref both having reverse score. The coefficients acquired indicated there was no strong correlation between the instruments. Regarding convergent validity, the WHODAS 2.0 mobility domain showed a moderate (r=–0.60) significant correlation with the WHOQOL-bref "physical health" domain. Likewise, there was moderate and significant correlation (r=–0.47) between the domain "interpersonal relations" and the domain "psychological health". The WHOQOL-bref "physical health" domain showed mostly moderate correlations with the WHODAS 2.0 domains, with the exception of the subdomain "work or school activity", which was not significant.

For divergent validity, there was no significant correlation between the WHODAS 2.0 "cognition" domain and the WHOQOL-bref "social relations" domain (r=–0.18) or between the WHODAS 2.0 "mobility" domain with the "social relations" and "environment" of WHOQOL-bref (r=–0.02 and r=–0.24, respectively). As a small number of people responded to the work-related domain, there was no significant relationship with any WHOQOL-bref item.

DISCUSSION

The instrument had adequate internal consistency in five of the six domains, with the exception of the work-related domain, which can be explained by the low number of respondents to these issues.

Due to the population profile of the study with visually impaired people who were mostly retired (66%), work-related items were not applicable. Nabais et al.[18] mention that the difficulty of getting into the job market that a significant number of Brazilians with visual impairments face is aggravated by the unfounded belief that disability affects all functions of an individual. Additionally, ignoring the many activities that a visually impaired person is able to perform may result in fear of workgroup integration problems or the occurrence of accidents, as well as concerns about the cost of adjusting and purchasing special equipment. Another factor mentioned by the authors is the low professional qualification of most of these people, caused by the lack of professional training for the disabled and difficulty in accessing existing courses[18].

It is important to note that in Brazil there exists the Social Security Law[19], which grants the benefit of

disability retirement with the objective of replacing the remuneration of the employee who is fully and definitively incapacitated for the exercise of any activity that is able to assure their survival.

Thus, for Brazil, the fact that most people with blindness are retired is a justified reality, since disability is included in the conditions of the disability retirement law and is, therefore, a right for these persons. This information justifies the low internal consistency obtained in the WHODAS 2.0 subdomain of school or work activities.

The results indicate good test-retest reliability for use of WHODAS 2.0 in this population. These findings are consistent with other studies using the same method of validation in other populations[20-24].

Likewise, the validity of the criterion was adequate with moderate correlations between related areas in WHODAS 2.0 and WHOQOL-bref, suggesting that the instruments, although correlated, are complementary in their use for different purposes. A strong correlation would be expected if they were instruments with identical domains, however, there is no other validated instrument that evaluates domains similarly to WHODAS 2.0, which justifies the choice of the WHOQOL-bref instrument for convergent and divergent validation.

The WHODAS 2.0 manual states there is a relationship between these instruments. However, whereas the WHODAS 2.0 assesses functionality, the WHOQOL-bref measures subjective measures of well-being. Ideally, the same areas of life should be evaluated by both instruments. As the constructs of the two instruments analyzed were correlated but not identical, moderate correlations would in fact be expected and were indeed obtained in most of the analyses performed.

The results suggest that the WHODAS 2.0 tool is valid for assessing the functionality of blind people and, due to the low internal consistency demonstrated in the school and work activities area, we suggest caution in using this item or even suggest their omission during evaluation. The same has been suggested by some studies that validated WHODAS 2.0 in other languages for people with rheumatoid arthritis[25], chronic diseases[26], knee osteoarthritis[22], schizophrenia[24], stroke[27], spinal cord injury[28] and breast cancer[29].

A possible limitation of this research is its reduced sample size, below n=100, a value recommended by the norms to verify psychometric variables[30,31].

However, it should be noted that the population segment analyzed has a low frequency in the general population, from which large-scale samples are taken. The estimated prevalence of blindness in Brazil by WHO is 1.98%[32,33],

which includes a more robust sampling. It is noteworthy that even with a small sample size, this study verified the validation of WHODAS 2.0 as a tool for use in blind people. We suggest that studies with larger samples be performed.

The relevance and importance of our research should be observed insofar as it provides further evidence for the safety and validity of the use of WHODAS 2.0, since four psychometric properties were tested, differing from the recent WHODAS 2.0 validation studies that tested, in their majority, two or three properties[22,24-29,34-40], as well as the innovation of validating the use of WHODAS 2.0 for blind people.

CONCLUSION

In conclusion, the test of psychometric properties – internal consistency, test-retest reliability, convergent and divergent criteria validity – confirmed that the Brazilian version of WHODAS 2.0 is valid and reliable for measuring characteristics of blind people.

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