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Adaptation and validation of WHODAS 2.0 in patients with musculoskeletal pain

ABSTRACT

OBJECTIVE: To validate the Portuguese version of the World Health Organization Disability Assessment Schedule (WHODAS 2.0).

METHODS: The original, 36 item version of the WHODAS 2.0, administered through an interview, was translated into Portuguese following international guidelines and tested on 9 participants from the general population. The Portuguese version was then administered to 204 patients with musculoskeletal pain. The patients' socio-demographic and health data were collected, as were the number of sites where they were experiencing pain and the intensity of that pain. The WHODAS 2.0 was administered again by a second interviewer within three days to determine its inter-rater reliability. Construct validity was assessed according to the ability of WHODAS 2.0 to discriminate between patients with different numbers of pain sites and the correlation between WHODAS 2.0 scores and pain intensity. Internal consistency was also assessed.

RESULTS: The Portuguese version of the WHODAS 2.0 is easily understood and has good internal consistency ($\alpha = 0.84$), as well as, very good inter-rater reliability (ICC = 0.95). In addition, it was able to detect statistically significant differences between patients with different numbers of pain sites ($p < 0.01$) and showed that higher levels of disability are associated with more intense pain ($r = 0.44$, $p < 0.01$), indicating that it has construct validity.

CONCLUSIONS: The Portuguese version of the WHODAS 2.0 has shown to be reliable and valid when administered to patients with musculoskeletal pain.

DESCRIPTORS: Pain Measurement. Musculoskeletal Pain, classification. Questionnaires, utilization. Translations. Reproducibility of Results.

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INTRODUCTION

Assessing disability provides a detailed picture of the implications a health condition has on the day to day life of an individual. This is especially relevant as different profiles of disability can be associated with similar pathologies and diagnoses.[1] Thus, an assessment which verifies in what ways health conditions affect the individual's daily activities is necessary.

The International Classification of Functioning, Disability and Health (ICF)[a] defines disability as difficulties in functioning in one or more areas of life from the perspective of the body, the individual and society, as experienced by an individual with a specific health condition in interaction with contextual factors. There are a variety of instruments for assessing disability, some specific to a certain health condition, some not, such as the Functional Independence Measure or the Barthel Index, among others. The World Health organization (WHO) developed the World Health Organisation Disability Assessment Schedule (WHODAS 2.0), which assesses perceived disability associated with the health condition in the 30 days preceding its application. This instrument is divided into six domains: i) cognition; ii) mobility; iii) self-care; iv) interpersonal relationships; v) activities of daily living; and vi) participation. This instrument enables the individual's perception of their own disability to be evaluated.[14] The WHODAS 2.0 is a generic instrument, not aimed at specific populations or specific health conditions. It has been translated and evaluated for use in various languages and cultures, both the original and the adapted versions proving to be psychometrically robust.[8,13,15] Three versions of the WHODAS 2.0 have been developed, differing in length and method of administration: there is a version with 36 items, one with 12 items and one with 12+24 items. The first two can be self-administered, administered in an interview and to a substitute respondent. The 12+24 item version has a version that can be administered in an interview or by computer.[1]

The aim of this study was to validate the Portuguese version of the WHODAS 2.0.

METHODS

The process of translating the original WHODAS 2.0 was carried out according to internationally established guidelines[3] involving the following steps:

- Step 1 (translation): the original English version of the WHODAS 2.0 was translated into European Portuguese by two independent translators, working in the area of health, whose mother tongue is Portuguese.

- Step 2 (synthesized version): Three researchers compared the abovementioned translations and produced a synthesized version using the translations and the original WHODAS 2.0.

- Step 3 (back-translation): The synthesized version was translated from Portuguese into English by another translator, whose mother tongue is English, with no training in the area of health and unfamiliar with the original WHODAS 2.0.

- Step 4 (pre-final version): A committee of three researchers developed the pre-final version of the WHODAS 2.0 based on the back-translation and the original instrument.

- Step 5 (pilot test): The pre-final version of the instrument underwent a pilot test with nine individuals from the general population in order to assess facility/difficulty of understanding it, following the methodology proposed by Foddy.[b] The data collected were used to improve the instrument and produce the final version. The Portuguese version was deemed easy to understand.

- Step 6: The back-translation and a description of the methodology used in the translation process were sent to the authors of the original WHODAS 2.0 for their approval.

The Portuguese version was validated by assessing its reliability, (internal consistency and inter-evaluator reliability) and construct validity.

The participants, patients being treated for problems connected to musculoskeletal pathologies at two rehabilitation clinics in the Aveiro region between January and April 2011, were invited to take part in the study evaluating the WHODAS 2.0. Inclusion criteria were: being aged $\geq$ 50 and experiencing pain linked to musculoskeletal pathologies. Those who had neurological disorders of the central nervous system (such as stroke and traumatic brain injury) and/or amputations in addition to the musculoskeletal pathology were excluded. There were 204 patients who agreed to participate, with a mean age of 65.9 (SD = 9.1); ages varied between 50 and 90 years old. Of the 204 participants, 44.6% were aged between 50 and 64 and 55.4% were aged over 60. Females constituted 71.6% of the sample (146 participants) (Table 1). The most commonly reported pathologies were osteoarthritis

[a] World Health Organization. International Classification of Functioning, Disability and Health. Geneva; 2001.
[b] Foddy WH. Constructing questions for interviews and questionnaires: theory and practice in social research. Cambridge: Cambridge University Press; 1993.

Table 1. Characterization of the sample used to validate the WHODAS 2.0, 2011.

Characteristics	n	%
Age group		
50 to 64 years old	91	44.6
≥ 65	113	55.4
Sex		
Female	146	71.6
Male	58	28.4
Marital status		
Single	7	3.4
Married	146	71.6
Separated	2	1.0
Divorced	13	6.4
Widowed	36	17.6
Schooling		
Cannot read and write	3	1.5
Can read and write	52	25.5
4 years	103	50.5
6 years	17	8.3
9 years	18	8.8
12 years	5	2.5
University degree	6	2.9
Occupation		
Paid work	29	14.2
Self-employed	11	5.4
Housewife	21	10.3
Retired	130	63.7
Unemployed (health reasons)	1	0.5
Unemployed (other reasons)	11	5.4
Other	1	0.5
Pathologies[a]		
High blood pressure	108	52.9
Diabetes	41	20.1
Arthritis	137	67.2
Spondylarthrosis	95	46.6
Cardiovascular disease	34	16.7
Respiratory disease	17	8.3
Cancer	2	1.0
Depression	3	1.5
Other	94	46.1
BMI[b]		
Underweight	1	0.5
Healthy weight	38	18.6
Overweight	97	47.5
Obese	68	33.3
Number of sites where pain is felt		
1 sites	37	18.1
2 to 3 sites	54	26.5
4 or more sites	52	25.5
Widespreadpain	61	29.9

WHODAS 2.0: World Health Organization Disability Assessment Schedule 2.0; BMI: Body Mass Index
[a] The sum of the percentages is above 100%, as participants may have indicated more than one pathology.
[b] BMI < 18.4 = underweight; 18.5 ≥ BMI ≤ 24.9 = healthy weight, 25 ≥ BMI ≤ 29.9 = overweight; BMI ≥ 30 = obese.

(67.2%), hypertension (52.9%) and spondylarthrosis (46.6%). A large proportion of the individuals were overweight (47.5%) or obese (33.3%). Many of the participants reported general pain (29.9%) (Table 1). The WHODAS 2.0 areas in which the participant reported the most disability were in activities of daily living, mobility and participation (Table 2).

Participants were interviewed twice at the rehabilitation clinics where they had been admitted. In the first interview, demographic and health data were collected and information on the number of sites where pain was felt and the intensity of that pain, and the 36 item WHODAS 2.0 was administered. In the second interview, the WHODAS 2.0 was administered.

Demographic data were collected (age, sex, marital status, years of schooling, occupation, height and weight). The values for height and weight were self-reported, wich is a valid method of characterizing the prevalence of being overweight and obesity.[4] The participants were asked whether they had been diagnosed with any of the following pathologies: high blood pressure, diabetes, arthritis, cardiovascular disease, respiratory disease, cancer, depression or other health problem.

The participants were asked to indicate on a body chart showing the whole body, where they had felt any pain in the preceding week. The number of sites with pain were counted and categorized according to Picavet et al[11] into: pain in one site; pain in two or three sites; pain in four or more sites; widespread pain (pain above and below the waist, pain on the left or right side of the body, and axial pain).

The intensity of the pain was assessed using a 10 cm visual numerical scale, showing a vertical classification from zero (no pain) to ten (the worst pain imaginable). Those participants who experienced pain in more than one site were asked to evaluate the mean intensity of the pain for the various sites over the preceding week (overall intensity). Pain assessment was carried out following international guidelines for assessing pain in the elderly.[c]

The 36 item version of the WHODAS 2.0, translated and adapted into European Portuguese using the methodology described above, was administered in two interviews by two different interviewers, with minimum and maximum intervals of one and three days, respectively. The repetition of the WHODAS 2.0 aimed to assess the inter-evaluator reliability. Limiting the interval between the two applications aimed to minimize the possibility of changes in the profile of the patient's disability, which would have compromised the assessment of reliability.

[c] Royal College of Physicians; British Geriatrics Society; British Pain Society. The assessment of pain in older people: national guidelines. London: RCP; 2007. (Concise Guidance to Good Practice Series, 8).

Table 2. Mean score and standard deviation for the sample for each of the WHODAS 2.0 domains and the total mean score, 2011.

Domain (D)	n	Score (mean)	Standard deviation
D1 – Cognition	204	11.7	17.4
D2 – Mobility	204	41.6	28.6
D3 – Self-care	204	17.5	17.9
D4 – Interpersonal relationships	204	6.6	14.2
D5.1 – Day to day activities (home)	179[a]	52.0	31.5
D5.2 – Day to day activities (work)	75[a]	42.0	30.3
D6 – Participation	204	37.4	16.2
Total[b]	204	28.1	19.9

WHODAS 2.0: World Health Organization Disability Assessment Schedule 2.0
[a] Some participants reported not doing housework and/or working.
[b] The total score was calculated without the values for area 5.2, as 63% of the participants reported they were not working.

The data analysis was carried out using the Statistical Package for the Social Sciences (SPSS). The sample was characterized using descriptive statistics (mean, standard deviation and frequencies). The WHODAS 2.0 scores were calculated per domain by adding the scores in each item in the domain and the total score was turned into a value between 0 and 100, as described in the WHODAS 2.0 manual. The higher the score, the greater the disability. Total scores were calculated taking into account the 36 items or taking into account all items except those referring to domain 5.2 "daily living activities" – work/school (total 32 items), when participants neither worked nor studied.[15]

Internal consistency was assessed using Cronbach's alpha (α), which varied between 0 and 1, with: ($\alpha < 0.6$) "unacceptable"; ($0.6 \leq \alpha < 0.7$) "weak"; ($0.7 \leq \alpha < 0.8$) "reasonable"; ($0.8 \leq \alpha < 0.9$) "good"; and ($\alpha \geq 0.9$) "very good".[10] Inter-evaluator reliability was assessed using the intra-class coefficient of correlation (ICC), which ranged between 0 and 1, considering "weak" (ICC < 0.4); "satisfactory" ($0.4 \leq$ ICC < 0.75); and "very good" (ICC ≥ 0.75).[12] Differences in the WHODAS 2.0 score between groups with different number of pain sites were assessed using ANOVA and the Bonferroni test.

Table 3. Cronbach's alpha results by WHODAS 2.0 domain and for the total score, 2011.

Domain (D)	n	Cronbach's Alpha
D1 – Understanding	65	0.83
D2 – Mobility	65	0.79
D3 – Self-care	65	0.84
D4 – Relationships	65	0.85
D5.1 – Housework	65	0.79
D5.2 – Work or school	65	0.76
D6 – Participation	65	0.80
Total	65	0.84

WHODAS 2.0: World Health Organization Disability Assessment Schedule 2.0

Correlation between WHODAS 2.0 and the intensity of pain was assessed using Pearson's coefficient of correlation. The level of significance was p < 0.05.

This study was approved by the Bioethics and Medical Ethics Service of the Faculty of Medicine of the *Universidade do Porto*, Portugal, 2011. Participants signed a consent form.

RESULTS

The overall Cronbach's alpha value for the 36 item version of the WHODAS 2.0 was 0.84, indicating good internal consistency. Due to non-applicable responses in domain 5 "activities of daily living" by the rest of the participants, 65 participants were considered in this analysis. The Cronbach's alpha value decreased with the removal of most of the items, indicating their importance in evaluating disability. Table 3 shows the results of the Cronbach's alpha test for all WHODAS 2.0 domains and the value obtained when each of these domains was removed.

The ICC was > 0.80 for all areas of the WHODAS 2.0, indicating good inter-evaluator reliability. The ICC was 0.95, taking into account the total WHODAS 2.0 score, which also indicates good inter-evaluator reliability (Table 4).

Construct validity was assessed by comparing the participants' level of disability with the different number of pain points and by assessing the link between disability and intensity of the pain, as the literature indicates that disability increases with the number of points at which pain is felt and with the intensity of that pain.[5,9,14] Statistically significant differences were found in the total WHODAS 2.0 scores between participants with widespread pain (mean = 35.7; SD = 13.3) and those with pain in only one spot (mean = 24.1; SD = 28.4, p = 0.009) and in two or three sites (mean = 29.0; SD = 14.1; p = 0.003), indicating greater incapacity in participants with widespread pain.

Table 4. Results for inter-evaluator reliability and correlation between WHODAS 2.0 and the intensity of pain experienced per domain and for the total score, 2011.

| Domain | n | Inter-evaluator reliability | | WHODAS – Intensity of pain |
		ICC	95%CI	
1. Understanding	204	0.88	0.84;0.91	0,29[b]
2. Mobility	204	0.93	0.91;0.95	0,46[b]
3. Self-care	204	0.90	0.87;0.92	0,37[b]
4. Relationships	204	0.80	0.73;0.85	0,19[b]
5.1. Housework	179[a]	0.89	0.85;0.92	0,45[b]
5.2. Work or school	75[a]	0.94	0.91;0.96	0,59[b]
6. Participation	204	0.90	0.87;0.93	0,47[b]
Total	204	0.95	0.94;0.96	0,44[b]

WHODAS 2.0: World Health Organization Disability Assessment Schedule 2.0
[a] Some participants reported not doing housework and/or working
[b] p < 0.01

The intensity of pain in the preceding week was 5.9 (SD = 2.0), verifying a statistically significant correlation between pain intensity and the WHODAS 2.0 (total and domain scores) indicating greater disability in participants with more intense pain (Table 4).

DISCUSSION

The 36 item Portuguese version of the WHODAS 2.0, administered in interview form, was deemed to be equivalent to the original version and easy to understand. The results of the psychometric properties evaluation showed the instrument has good internal consistency (α = 0.84). However, in studies by Baron et al,[2] Garin et al[7] and Ustun et al,[15] the alpha value was above 0.95. This difference may be explained by the small number of participants considered in this analysis (n = 65), due to non-applicable responses in domain 5 "activities of daily living: home and work or school" by the rest of the participants. A large number of participants reported not working or going to school and a large number of male participants reported not doing housework. The ICC for inter-evaluator reliability was 0.95, indicating good inter-evaluator reliability. This figure was higher than that obtained by Schlote et al,[13] who reported ICC of 0.67. However, the results of Schlote et al[13] may be explained by the long interval (six months) between the two WHODAS 2.0. The WHODAS 2.0 has been shown capable of finding logical relationships supported in the literature. In this study, individuals with widespread pain had lower functionality than those with pain in one spot or in two or three spots. More intense pain also seemed to be associated with lower functionality. Both findings are in concordance with the results of previous studies[5,6,9,14] and suggest that the instrument has construct validity. The results indicate that the 36 item Portuguese version of the WHODAS 2, administered in interview form, is valid and reliable. These results are in agreement with those presented by a variety of studies carried out using the original version on patients with inflammatory arthritis, knee osteoarthritis, chronic disease, osteoarthritis and strokes.[2,7,8,13]

One of the limitations of this study is that an disability measure validated in Portuguese, which would have allowed these results to be compared with those obtained by applying the WHODAS 2.0, was not used. One of the instruments used in the process of validating the WHODAS 2.0 in other countries is the health status questionnaire (SF 36). Although the SF36 and the WHODAS 2.0 assess different aspects of related concepts, as the former assesses quality of life related to health and the latter limitations to day to day activities and restrictions to participation, studies show that a moderate association exists between the scores from the two instruments. Therefore, using this instrument would have enabled criterion validity to be assessed, making the validation of this instrument more robust. Not using patients with diverse pathologies limits the possibilities of generalizing the results. Thus, in the future, it is necessary to assess this instrument for use in patients with other types of health conditions.

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