

International Literature Review on WHODAS II (World Health Organization Disability Assessment Schedule II)

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Abstract

This review is a critical analysis regarding the study and utilization of the World Health Organization Disability Assessment Schedule II (WHODAS II) as a basis for establishing specific criteria for evaluating relevant international scientific literature. The WHODAS II is an instrument developed by the World Health Organisation in order to assess behavioural limitations and restrictions related to an individual's participation, independent from a medical diagnosis. This instrument was developed by the WHO's Assessment, Classification and Epidemiology Group within the framework of the WHO/NIH Joint Project on Assessment and Classification of Disablements.

To ascertain the international dissemination level of for WHODAS II's utilization and, at the same time, analyse the studies regarding the psychometric validation of the WHODAS II translation and adaptation in other languages and geographical contexts. Particularly, our goal is to highlight which psychometric features have been investigated, focusing on the factorial structure, the reliability, and the validity of this instrument.

International literature was researched through the main data bases of indexed scientific production: the Cambridge Scientific Abstracts – CSA, PubMed, and Google Scholar, from 1990 through to December 2008. The following search terms were used: “whodas”, in the field query, plus “title” and “abstract”.

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The WHODAS II has been used in 54 studies, of which 51 articles are published in international journals, 2 conference abstracts, and one dissertation abstract. Nevertheless, only 7 articles are published in journals and conference proceedings regarding disability and rehabilitation. Others have been published in medical and psychiatric journals, with the aim of indentifying comorbidity correlations in clinical diagnosis concerning patients with mental illness. Just 8 out of 51 articles have studied the psychometric properties of the WHODAS II. The instruments have been translated into 11 languages and administered to a total of 88,844 subjects. Finally, the WHODAS II is prevalently used in the medical field, with major emphasis in the specialities of psychiatry, general medicine, and rehabilitation.

All studies point out that WHODAS II as an effective and reliable instrument in order to assess the disability, individual functioning and participation levels. Furthermore, they often suggest administering the WHODAS II along with quality of life measures. Finally, the studies about the psychometric properties of the instrument agree in considering the WHODAS II a reliable and valid tool for disability assessment.

Keywords: WHODAS II, WHO classifications, Biopsychosocial model, Disability classifications

1. Introduction

1.1. The classifications of disability: ICDH and ICF

1.1.1. The ICDH

Since 1948 the World Health Organization (WHO) has been the specialized agency of the United Nations to review the international nomenclature of diseases and standardize the methods of diagnosis (WHO, 1948). The success obtained from the edition of *International Classification of Disease* (ICD) led, in the early 1970s, to the preparation of a classification of the consequences of disease. Since 1975 there has been in circulation, as an internal document of the WHO, a version of the *International Classification of Impairments, Disabilities, and Handicaps* (ICIDH). Subsequently, the WHO requested Philip Wood to collect the material produced until then and transform it into a classification. In 1980 the WHO published the results, the ICDH, in a book for study and research (World Health Organization (WHO), 1980; cfr. also: Pfeiffer, 1998; Üstün, Bickenbach, Badley, & Chatterji, 1998). The aim of the ICDH was to clarify some concepts and terminology that were used with reference to disability, to facilitate research and policy choices in an area of growing importance. The classification has been translated into many languages and used to conduct statistical surveys on population, to encode information on the health of people

and as a starting point for the implementation of social and welfare policies. The ICIDH has an unquestionable merit: it introduced, from the health point of view, a first-time distinction and definition of terms that, until then, had been used interchangeably, creating considerable confusion among health professionals.

The ICIDH proposes a tripartite distinction between Impairment, Disability and Handicap, defined as follows:

- Impairment: any loss, or abnormality, of psychological, physiological or anatomical structures or functions.

- Disability: any limitation or loss (due to an impairment) of ability to perform an activity or variations in the way considered normal for a human being.

- Handicap: disadvantage experienced by a particular person, the result of an impairment or a disability that limits or prevents the opportunity to fill the role usually just one person (in relation to age, sex and socio-cultural factors).

In the definition of handicap a clear causal relationship is established between handicap and other conditions, i.e. the handicap is always the result of an impairment or the consequence of a disability. Therefore, the impairment, or disability, or both, are necessary so that we can talk about handicap; and yet, they are not sufficient, since not all impairments produce handicap. It is essential, according to the ICIDH, that the handicap is lived or experienced as such, that the person is aware of the disproportion between expected performance and that actually given because of the condition of disability.

The ICIDH was designed with the intent to offer a non-medical model of disability, and this is demonstrated by the substantial lack of aetiological factors. And yet, as the ICIDH declares that among the three levels of impairment, disability and handicap there is a relationship that can not be simply linear, literature evaluates the classification as the product of a cultural context in which the handicap was considered the product of an impairment and/or a disability. While it is acknowledged that the ICIDH is undoubtedly a tool developed with the goal of utilizing a common and universal language on disability at an international level (Üstün, Bickenbach, *et al.*, 1998; Bickenbach, Chatterji, Badley, & Üstün, 1999; Buono & Zagaria, 1999; Üstün, Chatterji, *et al.*, 2001), it has been the focus of great controversy, especially animated by the supporters of the social model of disability who considered the Classification too oriented towards the medical model (Chamie, 1995; Pfeiffer, 1998), despite what is claimed by its editors (Bury, 2000). In any case, we can only note that each of the three key concepts of classification is defined in relation to a concept of normality that it is assumed to be related primarily to biomedical categories.

1.1.2. The ICF

In 2001, the World Health Organization adopted the new International Classification of Functioning, Disability and Health. The final document collects work published over the last decade and which has had as its goal revision of the ICIDH. The nine years dedicated to completing the review process will certainly give an idea of the complexity of the problems dealt with and the extent of the criticisms raised by the proposal for a new Classification (Üstün, Bickenbach, *et al.*, 1998; Pfeiffer, 1998; Hurst, 2000; Pfeiffer, 2000). As has already been pointed-out, the criticisms about several conceptual aspects of the ICIDH, which has determined the need for a revision, are:

- The reference to a medical model of disability, which is sequential and causal, according to which disability (or/and handicap) is regarded as the direct outcome of an impairment of the individual.
- The application of an approach based on a linear succession considering the handicap as a direct consequence of impairment.
- The presence of a negative terminological *bias*, as most conditions are described by using a negative terminology.

From an operative viewpoint, the main limitations characterising the ICIDH were given by the use of terms which were inadequate with reference to the contemporary scientific context, as well as by the impossibility to compare data from different contexts (Chatterji *et al.*, 2001; Rehm *et al.*, 2001; Trotter *et al.*, 2001; Üstün, Chatterji *et al.*, 2001).

The linear progressive perspective applied in the old classification is abandoned in the ICF, to implement a circular interactive model in which functioning and disability of a person are considered as the product of the dynamic interaction between health conditions and contextual factors, including personal and environmental ones.

The structure of this new classification can thus be divided into two “parts”, each one including two “components”: Part 1, “Functioning and Disability”; including the following components: a) body functions and structures and b) activities and participation; Part 2, “Contextual factors”, including the following components: a) environmental factors and b) personal factors. Each component is formed by several domains, and each domain is organised in categories at different levels, which represents the units of classification.

Moreover, in contrast with the ICIDH, the ICF sets a common, “standard” language, which not only allows a common understanding and use by operators belonging to different professional areas, but is also easily applicable to remarkably different environmental contexts.

There are two consequences stemming from this approach:

- First, the context and the life environment of each individual dramatically influences the level of her/his functioning in presence of a given disability and, given the same *impairment*, different contexts have very diverse effects on individual functioning and adaptation.

- Secondly, any person during her/his life can experience a changing state of health which, in a given environment, becomes disabling, i.e. influencing negatively on the person's functioning abilities.

The ICF, wanting to describe functional states of each individual and his/her limitations, proposes a dynamic model of mutual interaction between health conditions and contextual factors.

The presence of an impairment necessarily implies a "cause", which may not be sufficient to explain the result of impairment.

Therefore, the disability is the complex and multidetermined outcome of three main factors: the health of an individual, the personal and environmental factors. The triadic reciprocal causation of factors exceeds the linear etiological prospect which from altered states of health leads to disability. In the new biopsychosocial model, the disability, understood both as a limitation of individual abilities as well as restrictions in social participation, is certainly related to a state of health, conventionally regarded as pathological, but not necessarily caused by the same condition as in the linear model of the ICDH.

The biopsychosocial model provides a perspective on the health concept that is not always in line with the medical one. Since different environments may have a very different impact on the same individual with a certain health condition, like the ICF notes «two persons with the same disease may have different levels of functioning and two persons with the same level of functioning not necessarily have the same condition of health» (ICF, p. 12). The interconnections between biological, structural, functional factors, of abilities, social participation, various contexts and personal and psychological dimensions do not allow simple aetiologies, focusing only on the physiopathological, anatomical and neurological levels.

1.2. Traditional tools for measuring and assessing the disability.

Specific rating scales for measuring disability can be regarded as the Barthel Index and FIM (*Functional Independence Measure*). The first one has the advantage that it can be administered quickly and without special training; the second one involves slightly longer times of administration and requires specific training.

The Barthel Index (Mahoney & Barthel, 1965) is an ordinal scale with total score from 0 (totally dependent) to 100 (totally independent) and comprising 10 items. The index shows the level of autonomy in various activities: feeding, taking a bath, personal hygiene, dressing, rectum and bladder control, transfers to bathroom or chair/bed, walking and climbing stairs. The performance should be established using the best available data, the usual sources are direct questions to the patient, friends/relatives and nurses, but also direct observation and common sense are important. Excellent validity and reliability are the strong points of the index that, however, appears to be subject to a "plateau" effect in highlighting the changes in more

complex functions. Reflecting a background determined by the cultural prevalence of the medical model, the Barthel index assigns an absolutely relevant weight to functions such as continence or mobility and not the least, also explores self-sufficiency in cognitive areas. Moreover, it is not a real standard, since there are at least 8 different versions published that differ in the number of items and methodology in assignment of scores.

Also the FIM (Keith, Granger, Hamilton, & Sherwin, 1987) measures self-sufficiency in 18 activities of daily living (like dressing, feeding, locomotion, etc.) that cumulatively provide a quantitative index of disability. Beyond the advantages of scale, such as the statistical validity, the simplicity of implementation and the ability to compare data at the international level, thanks to its wide distribution, the FIM is an instrument that assesses the level of self-sufficiency of a person from the perspective of an outside observer, leaving no space for self-evaluation.

1.3. The assessment of disability according to the biopsychosocial model

The direct application of the ICF and its codes appeared since the beginning as a rather demanding and complex task: for this reason, the WHO introduced the ICF Checklist (WHO, 2003), which allows the description of the functioning profile of a subject based on 128 codes selected among the thousands forming the whole ICF (in the second level there are already 362 codes, that become 1.424 in the third and fourth level) (*ivi*, p. 3). The ICF checklist is not really an instrument for measure or assessment: its utility comes from the possibility to “open” the codes on the basis of the identification of a person’s functioning problem, and at the same time to establish whether, and in which measure, the environment acts either as barrier or conversely facilitates the individual.

The ICF Checklist is administered to the patient or his/her caregiver. It is structurally divided into four parts: the introductory part, which includes biographical data, the ICD-10 code, and the specification of information source; the first part, containing the list of codes of Body Functions (b) and Body Structures (s); the second part, comprising the list of codes for Activities and Participation (d); and finally, the third part, containing the list of codes relating to Environmental Factors (e). In Italy, the translation, validation, and a first application in the research and clinical field were coordinated by the Disability Italian Network (DIN) in 2004.

The WHODAS II, however, proposes to evaluate the disability from a different viewpoint from that of the normal tools of measurement. In fact, while the ICF Checklist was developed as a practical tool to elicit clinicians’ overall impressions of a patient’s condition and to record information on functioning and disability, the WHODAS II rates the nature of disability directly from the patient’s responses. Therefore, the ICF Checklist offers an external (objective) view on disability while the WHODAS II does an internal (subjective) one.

The WHODAS II assesses the limitations in activities and restrictions in participation experienced by an individual, independently from a medical diagnosis. Specifically, the instrument is designed to evaluate the functioning of the individual in six activity domains:

1. Understanding and communicating
2. Getting around
3. Self-care
4. Getting along with people
5. Life activities
6. Participation in society

There are different forms of the WHODAS II, each of them has been structured in relation to the number of item (6, 12, 24, 12 + 24 and 36), the mode of administration (self-administered or administered by an interviewer) and the user to whom the interview is proposed (subject, clinician, caregiver). In any case, the WHO recommends the use of the 36 item form administered by an interviewer for completeness.

The participants interviewed are asked to indicate the experienced level of “difficulty” (*none, mild, moderate, severe, extreme*), by taking into account the way in which they normally perform a given activity, and including the use of whatever support or/and help by a person (*aids*). For every item receiving a positive answer, the subsequent question asks the number of days (“*in the last 30 days*”) in which the interviewed has met such a difficulty, in terms of a 5-point ordinal scale: 1) Only one day; 2) Up to a week = from 2 to 7 days; 3) Up to two weeks = from 8 to 14 days; 4) More than two weeks = from 15 to 29 days; 5) Every day = 30 days.

Then, the person is asked how much the difficulties have interfered with his/her life.

Respondents should answer the questions according to the following references:

1. Degree of difficulty (the increase in the effort, discomfort or pain, or slowness, or differences in general);
2. Health conditions (disease or illness, or injury, or mental or emotional problems, or related to alcohol, or problems associated with drug abuse);
3. The last 30 days;
4. The average between “good” and “bad” days;
5. The way in which they normally perform the activity.

The items that refer to activities not experienced in the last 30 days are not classified.

2. Purpose and methodology

The general aim of the study presented here is to check the spread of the WHODAS II at international level and in different fields of application

Specifically, given the widespread consent universally reached about the usefulness of the WHODAS II, we need to verify its reliability in assessing the functioning and the self-perception of disability in persons with normal abilities and disabled participants, both through the analysis of some psychometric characteristics such as reliability, validity and factorial structure, either through correlational analysis. The bibliographic review, in the next paragraph, is intended to provide an overview, as complete as possible, of scientific studies that have been made using the WHODAS II, since its publication until now. In most of these studies, moreover, the WHODAS II was used in combination with other assessment tools: this has allowed us to verify its convergent validity, and its compatibility and complementarities with these instruments.

A survey on the main databases of international indexed scientific production, Cambridge Scientific Abstracts – CSA and PubMed, using as key search the term “whodas” in the “title” and “abstract” field query, it was found that the WHODAS II was used in 54 works. Table 1 shows the list of the 54 studies, specifying for each the type of study, the number of participants, the nationality, the field of research and the main purposes and results.

Tab. 1 - International literature on WHODAS II

Articles published in international journals	Type of study	Nationality	Subjects	Area of research	Purposes	Results
1. Alexopoulos <i>et al.</i> (2003). Problem-solving therapy versus supportive therapy in geriatric major depression with executive dysfunction.	Quantitative empirical study of clinical treatment	United States	25	Psychiatry	Comparison of the effectiveness of problem-solving therapy and supportive care in a group of elderly subjects with executive dysfunction.	Effectiveness of treatment for problem-solving recognized.
2. Annicchiarico <i>et al.</i> (2004). Qualitative profiles of disability.	Qualitative empirical study	Italy	96	Disability and rehabilitation	Identification of profiles of functional disability parallel to increased levels of disability.	Identification of four groups of individuals with disabilities.
3. Badr <i>et al.</i> (2007). Role of Gender in Coping Capabilities among Young Visually Disabled Students.	Correlational quantitative empirical study	Egypt	200	Disability and rehabilitation	Evaluation of the role of gender in coping skills among young visually disabled students.	Correlation occurred.
4. Banerjee <i>et al.</i> (2008). Prevalence of depression and its effect on disability in patients with age-related macular degeneration.	Correlational quantitative empirical study	India	53	Psychiatry	Assessment of depression effects on disability in patients with visual macular degeneration.	Correlation occurred.
5. Baron <i>et al.</i> (2008). The clinimetric properties of the world health organization disability assessment schedule II in early inflammatory arthritis.	Psychometric quantitative empirical study	Canada	172	Medicine	Evaluation of clinimetric properties of the WHODAS II in patients with early inflammatory arthritis.	Good reliability and validity.
6. Bonnewyn <i>et al.</i> (2005). The impact of mental disorders on daily functioning in the Belgian community.	Epidemiological correlational quantitative empirical study	Belgium	2419	Medicine	Assessing the impact of mental disorders on daily functioning of the Belgian population.	Correlation occurred.
7. Buist-Bouwman <i>et al.</i> (2008). Psychometric properties of the World Health Organization Disability Assessment Schedule used in the European Study of the Epidemiology of Mental Disorders.	Psychometric quantitative empirical study	Netherlands	8796	Psychiatry	Validation of the version of WHODAS used in the European Study of the Epidemiology of Mental Disorders (ESEMED).	Good reliability and validity and factorial structure confirmed.
8. Chisolm <i>et al.</i> (2005). The WHO-DAS II: psychometric properties in the measurement of functional health status in adults with acquired hearing loss.	Psychometric quantitative empirical study	United States	380	Disability and rehabilitation	Definition of the psychometric properties of the WHODAS II for a sample of adults with onset of hearing loss.	Good reliability and validity.

9. Chopra <i>et al.</i> (2004). The assessment of patients with long-term psychotic disorders: Application of the WHO Disability Assessment Schedule II.	Psychometric quantitative empirical study	Australia	20	Psychiatry	Evaluation of the WHODAS II in patients treated for long-term psychotic disorders.	Good reliability and validity.
10. Chopra <i>et al.</i> (2008). Comparison of disability and quality of life measures in patients with long-term psychotic disorders and patients with multiple sclerosis: an application of the WHO Disability Assessment Schedule II and WHO Quality of Life-BREF.	Correlational quantitative empirical study	Australia	40	Psychiatry	Comparison between the application of the WHODAS II and the WHOQOL-BREF in the evaluation of patients with psychotic disorders and multiple sclerosis.	Correlation confirmed.
11. Chwastiak <i>et al.</i> (2003). Disability in depression and back pain: evaluation of the World Health Organization Disability Assessment Schedule (WHO DAS II) in a primary care setting.	Psychometric quantitative empirical study	United States	149	Medicine	Evaluation of measurement properties of the WHODAS II in two disorders commonly encountered in primary care setting.	Good validity and responsiveness to change.
12. Donmez <i>et al.</i> (2005). Disability and its effects on quality of life among older people living in Antalya city center, Turkey.	Correlational quantitative empirical study	Turkey	840	Medicine	Detection of frequency and severity level of disability for older people living in Antalya city center; evaluation of the effects of disability and variables associated with it on living conditions.	Frequency and severity detected; correlation detected.
13. Ertugrul <i>et al.</i> (2004). Perception of stigma among patients with schizophrenia.	Correlational quantitative empirical study	Turkey	60	Psychiatry	Measurement of the relationship between the symptoms and other characteristics of schizophrenic patients with self-perceived stigma.	Correlation occurred.
14. ESEMED/MHEDEA 2000 investigators. (2004). Disability and quality of life impact of mental disorders in Europe.	Epidemiological correlational quantitative empirical study	Belgium, Germany, Italy, Spain, France and Netherlands	21425	Psychiatry	Survey on the impact of the state of mental health and specific mental and physical disorders on work performance and quality of life in six European countries.	Correlations occurred.
15. Federici <i>et al.</i> (2008). World Health Organization Disability Assessment Schedule II (WHODAS II): A contribution to the Italian validation.	Psychometric quantitative empirical study	Italy	500	Disability and rehabilitation	Validation of the Italian version of the WHODAS II.	Good validity and reliability and factorial structure confirmed.
16. Gallagher <i>et al.</i> (2004). Levels of ability and functioning: using the WHODAS II in an Irish context	Correlational quantitative empirical study	Ireland	1304	Disability and rehabilitation	Correlational analysis between socio-demographic variables, causes of disability and domains of individual	Correlations confirmed.

17. Goyal <i>et al.</i> (2002). Efficacy of Menosan, a polyherbal formulation in the management of menopausal syndrome with respect to quality of life.	Correlational quantitative empirical study	India	40	Medicine	the WHODAS II. Assessment of the effects of Menosan, a polyherbal formulation, on quality of life in menopausal women.	Correlation confirmed; efficacy of Menosan demonstrated.
18. Hudson <i>et al.</i> (2008). Clinical correlates of quality of life in systemic sclerosis measured with the World Health Organization Disability Assessment Schedule II.	Correlational quantitative empirical study	Canada	337	Medicine	Identification of clinical features of systemic sclerosis that best correlate with the quality of life related to the health of patients.	Clinical correlates identified.
19. Hudson <i>et al.</i> (2008). Quality of life in systemic sclerosis: psychometric properties of the World Health Organization Disability Assessment Schedule II.	Psychometric quantitative empirical study	Canada	402	Medicine	Study of validity of the WHODAS II in patients with systemic sclerosis.	Good validity.
20. Janca <i>et al.</i> (1996). The World Health Organization Short Disability Assessment Schedule (WHO DAS-S): a tool for the assessment of difficulties in selected areas of functioning of patients with mental disorders.	Analytical study	Switzerland	0	Psychiatry and medicine	Study of characteristics of the WHODAS-S as a clinical tool for evaluation of individual functioning in psychiatric subjects.	Detection of a good utility and ease of use and acceptable reliability for use by clinicians belonging to different schools and psychiatric traditions.
21. Kemmler <i>et al.</i> (2003). Quality of life of HIV-infected patients: Psychometric properties and validation of the German version of the MOOL-HIV.	Psychometric quantitative empirical study	Germany	207	Medicine	Convergent validity study of the German version of the Multidimensional Quality of Life Questionnaire for HIV/AIDS on a sample of HIV-infected patients.	Good validity and reliability of the Multidimensional Quality of Life Questionnaire for HIV/AIDS; convergent validity demonstrated.
22. Kessler <i>et al.</i> (2003). The Epidemiology of Major Depressive Disorder: Results from the National Comorbidity Survey Replication (NCS-R).	Epidemiological correlational quantitative empirical study	United States	9090	Medicine	Survey on prevalence, correlation and clinical relevance of the DSM disorders and assessment of treatments adequacy.	Prevalence, correlates and clinical relevance identified; inadequacy of treatment detected.
23. Kim <i>et al.</i> (2005). Physical health, depression and cognitive function as correlates of disability in an older Korean population.	Correlational quantitative empirical study	South Korea	1204	Psychiatry	Survey on independent associations between physical health, depression, cognitive function and disability in the older Korean population.	Correlations confirmed.
24. Kim <i>et al.</i> (2008). BDNF	Correlational quantitative	South Korea	500	Psychiatry	Survey on the role of a genotype (val66met) of the neurotrophic factor	Correlation confirmed.

association between incident stroke and depression.	empirical study				derived from the brain (BDNF) in the association between stroke and depression. Check the classification of a schizophrenic population into subgroups for similar symptoms profiles.	Division into subgroups confirmed, but not predictive.
25. Lastra <i>et al.</i> (2000). The classification of first episode schizophrenia: a cluster-analytical approach.	Qualitative empirical study	Spain	86	Psychiatry		
26. MaGPIe Research Group. (2004). General practitioner recognition of mental illness in the absence of a 'gold standard'.	Correlational quantitative empirical study	New Zealand	845	Psychiatry	Comparison between the general practice of recognition of mental illness and the cases identified by diagnostic instruments and screening.	Correlation is not verified; variability between instruments and between clinical opinion and screening and diagnostic tests. Correlations confirmed.
27. MaGPIe Research Group. (2003). The nature and prevalence of psychological problems in New Zealand primary healthcare: a report on Mental Health and General Practice Investigation (MaGPIe).	Correlational quantitative empirical study	New Zealand	70	Medicine	Study of the degree of disability and other factors that influence the recognition, management, course and outcome of mental disorders in patients of New Zealand.	Correlations confirmed.
28. Mattias-Carrello <i>et al.</i> (2003). The Spanish translation and cultural adaptation of five mental health outcome measures.	Qualitative empirical study of translation and adaptation	Spain	130	Medicine	Spanish translation and adaptation of five measures of mental health.	Semantic, technical and content equivalence demonstrated.
29. McArdle <i>et al.</i> (2005). The WHO-DAS II: measuring outcomes of hearing aid intervention for adults.	Correlational quantitative empirical study	United States	380	Disability and rehabilitation	Assessment of reactivity of the WHODAS II to the short and long term effects in applications of acoustic devices.	Good reactivity of the WHODAS II, correlation detected.
30. McKibbin <i>et al.</i> (2004). Assessing Disability in Older Patients With Schizophrenia Results From the WHODAS-II.	Psychometric quantitative empirical study	United States	76	Medicine	Evaluation of reliability and validity of the WHODAS II in older patients with schizophrenia.	Strong evidence of good reliability and some evidence of good validity. Correlation confirmed.
31. Mubarak AR. (2005). Social functioning and quality of life of people with schizophrenia in the northern region of Malaysia.	Correlational quantitative empirical study	Malaysia	258	Medicine	Investigation on the relationship between social functioning and quality of life of people with schizophrenia in Malaysia.	Correlations confirmed.
32. Norton <i>et al.</i> (2004). Psychiatric morbidity, disability and service use amongst primary care attenders in France.	Correlational quantitative empirical study	France	124	Psychiatry	Investigation on the relationship between psychiatric morbidity, disability and use of services in French patients.	Correlations confirmed.
33. Perini <i>et al.</i> (2006). Generic effectiveness measure: Sensitivity to	Correlational quantitative	Australia	169	Medicine	Study with convergent measures on sensitivity to change in people with	Convergent validity demonstrated

disorders.									
34. Pettersson <i>et al.</i> (2006). The effect of an outdoor powered wheelchair on activity and participation in users with stroke.	Quantitative and longitudinal empirical study	Sweden	32	Disability and rehabilitation	Self-evaluation of the limitations in activities and restrictions in the participation of people with stroke, before and after the use of an outdoor powered wheelchair.	Positive effects of wheelchair found.			
35. Pösl <i>et al.</i> (2007). Psychometric properties of the WHODAS II in rehabilitation patients.	Psychometric quantitative empirical study	Germany	904	Disability and rehabilitation	Validation of the German version of the WHODAS II.	Good validity and factorial structure confirmed.			
36. Post <i>et al.</i> (2008). Development and validation of IMPACT-S, an ICF-based questionnaire to measure activities and participation.	Psychometric quantitative empirical study	Netherlands	276	Disability and rehabilitation	Validation of the IMPACT-S, an ICF-based questionnaire to measure activity and participation.	Good concurrent validity, test-retest reliability and internal consistency.			
37. Pyne <i>et al.</i> (2003). Comparing the Sensitivity of Generic Effectiveness Measures With Symptom Improvement in Persons With Schizophrenia.	Correlational quantitative empirical study	United States	134	Medicine	Study with convergent measures on the sensitivity of generic effectiveness in improving the symptoms of people with schizophrenia.	Convergent validity demonstrated.			
38. Pyszcz <i>et al.</i> (2006). Disability, psychological distress and quality of life in breast cancer survivors with arm lymphedema.	Correlational quantitative empirical study	Poland	1000	Medicine	Assessment of disability, psychological distress and quality of life in breast cancer Polish survivors with arm lymphedema.	Correlations confirmed.			
39. Roth <i>et al.</i> (2006). Sleep Problems, Comorbid Mental Disorders, and Role Functioning in the National Comorbidity Survey Replication.	Epidemiological correlational quantitative empirical study	United States	9282	Psychiatry	National survey on the prevalence of sleep disorders, or the associations of sleep disorders with role disorders related to comorbidity of mental disorders.	Correlations confirmed.			
40. Schlote <i>et al.</i> (2008). Use of the WHODAS II with stroke patients and their relatives: reliability and inter-rater-reliability.	Psychometric quantitative empirical study	Germany	168	Disability and rehabilitation	Measurement of the reliability of WHODAS II with stroke patients and their relatives.	Good reliability.			
41. Scott <i>et al.</i> (2006). Disability in Te Rau Hinengaro: The New Zealand Mental Health Survey.	Correlational quantitative empirical study	New Zealand	12992	Psychiatry	Study on relationship between the disability and the presence of mental disorders and chronic physical conditions in the population of New Zealand, controlling comorbidity, age and sex.	Correlations identified.			
42. Scott <i>et al.</i> (2008). Mental-physical co-morbidity and its	Correlational quantitative empirical study	New Zealand	697	Medicine	Survey on mental-physical comorbidity and on its relationship with disability.	Small correlation identified.			

from the World Mental Health Surveys.							
43. Soberg <i>et al.</i> (2007). Long-term multidimensional functional consequences of severe multiple injuries two years after trauma: a prospective longitudinal cohort study.	Norway	105	Medicine	Evaluation, through prospective cohort study, of the functioning and quality of life in patients with severe multiple injuries.	Correlation identified.		
44. Stucki <i>et al.</i> (2003). Assessment of the impact of disease on the individual.	Germany	0	Medicine	Review of self-administered measures on the health	About the WHODAS states that the validity and reliability of the instrument are still under investigation. Good reliability and validity.		
45. Ulug <i>et al.</i> (2001). Reliability and validity of the Turkish version of the World Health Organization Disability Assessment Schedule-II (WHO-DAS-II) in schizophrenia.	Turkey	90	Psychiatry	Psychometric quantitative empirical study	Validation of the Turkish version of the WHODAS II in patients with schizophrenia.		
46. van Tubergen <i>et al.</i> (2003). Assessment of disability with the World Health Organisation Disability Assessment Schedule II in patients with ankylosing spondylitis.	Netherlands	214	Medicine	Correlational quantitative empirical study	Convergent validity study in patients with ankylosing spondylitis.		
47. Vázquez-Barquero <i>et al.</i> (2000). Spanish version of the new World Health Organization Disabling Assessment Schedule II.	Spain	163	Psychiatry	Psychometric quantitative empirical study	Validation of the Spanish version of the WHODAS II.		
48. Von Korff <i>et al.</i> (2005). Potentially Modifiable Factors Associated With Disability Among People With Diabetes.	United States	4357	Medicine	Correlational quantitative empirical study	Identification of potentially modifiable factors associated with disability in people with diabetes.		
49. Von Korff <i>et al.</i> (2008). Modified WHODAS-II provides valid measure of global disability but filter items increased skewness.	United States	934	Medicine	Psychometric quantitative empirical study	Validation of a modified version of the WHODAS II with filter items.		
50. Wang <i>et al.</i> (2006). Mental health and related disability among workers: A population-based study.	Canada	5383	Medicine	Correlational quantitative empirical study	Survey on the prevalence of psychiatric syndromes and related disability in a population of adult workers.		

51. Yoon <i>et al.</i> (2004). Development of Korean version of World Health Organization Disability Assessment Schedule II (WHODAS II-K) in Community Dwelling Elders.	Psychometric quantitative empirical study	Korea	1204	Neuropsychiatry	Validation of the Korean version of the WHODAS II with elderly subjects.	Good validity and reliability and factorial structure confirmed.
Subtotal of subjects 88332						
Studies included in conferences	Type of study	Nationality	Subjects	Area of research	Purposes	Results
1. Baron <i>et al.</i> (2005). Preliminary study of the validity of the World Health Organization Disease Assessment Schedule (WHODAS II) in patients with scleroderma.	Psychometric quantitative empirical study	Canada	67	Medicine	Study on psychometric characteristics of the WHODAS II in patients with scleroderma.	Good validity.
2. Federici <i>et al.</i> (2003). A Cross-Cultural Analysis of Relationships between Disability Self-Evaluation and Individual Predisposition to Use Assistive Technology.	Correlational quantitative empirical study	Italy and United States	200	Disability and rehabilitation	Study on correlation between disability self-evaluation, individual coping strategies and individual predisposition to the use of assistive technologies.	Correlations identified.
Subtotal of subjects 267						
Dissertations	Type of study	Nationality	Subjects	Area of research	Purposes	Results
1. Baumgartner J.N. (2004). Measuring disability and social integration among adults with psychotic disorders in Dar es Salaam, Tanzania.	Correlational quantitative and qualitative empirical study	Tanzania	245	Psychiatry	Study on the relationship between the severity of self-perceived disability and indicators of social integration (marital status, fertility and employment) in adult patients with psychotic disorders in Tanzania.	Correlation confirmed between severity of self-perceived disability and one indicator of social integration: the employment.
Total of subjects 88844						

3. Review of international literature on the WHODAS II

Among the 54 studies identified by following the method described above, 51 are articles published in international journals, 2 were included in the conferences and one is a dissertation. However, only seven articles were published in journals or acts of conferences whose main object of interest is disability and rehabilitation (Federici, Scherer, Micangeli, Lombardo, & Olivetti Belardinelli, 2003; Annicchiarico, Gibert, Cortes, Campana, & Caltagirone, 2004; Gallagher & Mulvany, 2004; Chisolm, Abrams, McArdle, Wilson, & Doyle, 2005; McArdle, Chisolm, Abrams, Wilson, & Doyle, 2005; Pettersson, Törnquist, & Ahlström, 2006; Federici, Meloni, Mancini, Lauriola, & Olivetti Belardinelli, 2009). The remaining works were published in journals of medicine and psychiatry; the main purpose of these studies is the identification of correlations on comorbidity evaluations performed by clinicians about certain mental disorders. All these studies have investigated the correlation between the 6 domains of the WHODAS and/or its total score with the scores obtained on scales measuring depression (Alexopoulos, Raue, & Areán, 2003; Chwastiak & Von Korff, 2003; Kemmler *et al.*, 2003; Kessler *et al.*, 2003; McKibbin, Patterson, & Jeste, 2004; Yoon *et al.*, 2004; Kim *et al.*, 2005; Von Korff *et al.*, 2005; Scott, McGee, Wells, & Browne, 2006; Banerjee *et al.*, 2008), pain (Chwastiak & Von Korff, 2003; Stucki & Sigl, 2003; Pyszel, Malyszczak, Pyszel, Andrzejak, & Szuba, 2006; Soberg, Bautz-Holter, Roise, & Finset, 2007), schizophrenia and psychotic disorders (Janca *et al.*, 1996; Lastra *et al.*, 2000; Ulug, Ertugrul, Gögüs, & Kabakçi, 2001; Pyne, Sullivan, Kaplan, & Williams, 2003; Baumgartner, 2004; McKibbin *et al.*, 2004; Norton, de Roquefeuil, Benjamins, Boulenger, & Mann, 2004; Mubarak, 2005; Chopra *et al.*, 2008), quality of life (Goyal & Kulkarni, 2002; Kemmler *et al.*, 2003; Pyne, Sullivan, Kaplan, & Williams, 2003; Chopra, Couper, & Herrman, 2004; ESEMeD/MHEDEA 2000 investigators, 2004; Donmez, Gokkoca, & Dedeoglu, 2005; Mubarak, 2005; Pyszel, Malyszczak, Pyszel, Andrzejak, & Szuba, 2006; Pösl, Miriam, Alarcos Cieza, & Gerold Stucki, 2007; Soberg, Bautz-Holter, Roise, & Finset, 2007; Baron *et al.*, 2008; Hudson, Steele, Taillefer, & Baron, 2008; Hudson, Thombs, Steele, Watterson, Taillefer, & Baron, 2008), sleep disorders (Roth *et al.*, 2006), diabetes (Von Korff *et al.*, 2005), ageing (Alexopoulos *et al.*, 2003; Yoon *et al.*, 2004; Kim *et al.*, 2005; Donmez, Gokkoca & Dedeoglu, 2005), rheumatic disorders (Stucki & Sigl, 2003; van Tubergen *et al.*, 2003; Baron, Hudson, & Taillefer, 2005), anxiety disorders (Bonnewyn, Bruffaerts, Van Oyen, Demarest, & Demyttenaere, 2005; Perini, Slade, & Andrews, 2006), strokes (Schlote *et al.*, 2008), coping skills (Badr *et al.*, 2007), cognitive functions (Kim *et al.*, 2008), limitations of activity and restrictions in participation (Post *et al.*, 2008) or in epidemiological and comorbidity national and international surveys (Kessler *et al.*, 2003; MaGPIe Research Group, 2003; ESEMeD/MHEDEA 2000 investi-

gators, 2004; MaGPIe Research Group, 2004; Bonnewyn *et al.*, 2005; Donmez *et al.*, 2005; Wang, Adair, & Patten, 2006; Buist-Bouwman *et al.*, 2008; Scott *et al.*, 2008).

The results obtained in these studies emphasize, first, that the WHODAS II is a useful, reliable and valid tool for assessment of disability, functioning and social participation, and is sensitive to changes like the SF-36 (*Medical Outcomes Study Short Form 36*); secondly, it facilitates the use of the ICF as a conceptual framework for the assessment of the limitations in activity and participation, and effectively discriminates between normal/healthy and disabled/sick people (Ertugrul & Ulug, 2004). Some studies suggest to using the WHODAS II together with the SF-36 (Chwastiak & Von Korff, 2003; Pyne *et al.*, 2003; Baron *et al.*, 2005; Von Korff *et al.*, 2005; Perini *et al.*, 2006; Soberg *et al.*, 2007) or with the WHO Quality of Life – short version (WHQOL-BREF) in order to improve the health profile (Goyal & Kulka-rni, 2002; Kemmler *et al.*, 2003; Chopra *et al.*, 2004) or together with *Coping Inventory for Stressful Situations* (CISS) and *Matching Person and Technology* (MPT) to assess the individual coping strategies and the predispositions to assistive technologies (Federici *et al.*, 2003). Actually, the WHODAS II is a tool relatively complex and difficult to administer with full cooperation in psychiatric patients who reported that they were healthy and denied “emotional or mental problems” as described in the WHODAS II (Chopra *et al.*, 2004, p. 757).

Among the 51 articles, only eight have investigated the psychometric properties of the WHODAS II (Vázquez-Barquero *et al.*, 2000; Ulug *et al.*, 2001; Yoon *et al.*, 2004; Baron *et al.*, 2005; Chisolm *et al.*, 2005; Buist-Bouwman *et al.*, 2008; Von Korff *et al.*, 2008; Federici *et al.*, 2009) and one reports the translation into Spanish and its adaptation to the Latino culture (Matías-Carrelo *et al.*, 2003).

Vázquez-Barquero and his/her collaborators (Vázquez-Barquero *et al.*, 2000) have studied the development of the Spanish version of the WHODAS II through a pilot cross-cultural analysis with 54 Spanish, 50 Cubans and 59 Peruvians, male and female, adults. Factor analysis, analysis of redundancy and missing values were conducted. The scores of the modified version of the instrument were compared with those of other countries. The Authors, however, failed to reach a clear and definitive assessment of the tool, merely to suggest further study on its psychometric properties.

Ulug *et al.* (2001) have assessed the reliability and validity of Turkish version of the WHODAS II, in a study with 60 patients diagnosed with schizophrenia. The Cronbach's Alpha, calculated for each of the six domains, reached values between .60 and .90, making possible to assess an acceptable internal consistency of the instrument. Regarding construct validity, domain scores displayed significant positive correlations with each other as well as with the total DAS score. According to the Authors, therefore, the WHODAS II is able to distinguish patients from control subjects; in ad-

dition, the results show that the Turkish version of the instrument has satisfactory requirements of validity and reliability.

The study of Yoon *et al.* (2004) was conducted to assess the Korean version of the WHODAS II, the sample consisted of 1204 elderly (aged 65 years or over) South Korean, community residents. In this study the WHODAS II-K showed high levels of internal consistency and reliability (*split-half, inter-rater and test-retest reliability*). In the correlation analyses, scores on the WHODAS II-K were significantly correlated with the unfavorable conditions in all variables on health condition and contextual factors. Partial correlations of scores on the WHODAS II-K with the health condition were significant even after controlling for contextual factors. Therefore, the conclusion of the authors is that the WHODAS II-K is a reliable and valid instrument for assessing disability in elderly population. More recently, a preliminary study of validity was conducted on 67 Canadian subjects suffering from scleroderma. (The title of the poster appears as substantially confusing. We have attributed this to a misprint). The short abstract also does not provide sufficient information for an assessment of the study.

Chisolm *et al.* (2005) examined the psychometric properties of the English version of the WHODAS II, in a sample of 380 adults with hearing loss. The results of the analysis of convergent validity showed that the WHODAS II-E is correlated with the scores of the *Abbreviated Profile of Hearing Aid Benefit* (APHAB), the *Hearing Aid Handicap for the Elderly* (HHIE), and the SF-36 (*short form*). The internal consistency of scores in different domains was satisfactory, except for the domain "Interactions and relationships with others".

The test-retest stability was adequate for the scores of all domains. Buist-Bouwman *et al.*, (2008) have assessed the factorial structure, the internal consistency and the discriminant validity of the ESEMeD version of the WHODAS II, that is used in a *European Study of Epidemiology of Mental Disorders*. The sample was 8796 adults. The study confirms the structure of six factors of the WHODAS II, finds a good internal consistency of the instrument and also the results of discriminant validity appear, on a preliminary analysis, as acceptable. Finally, Von Korff *et al.* (2008) consider the psychometric properties of a WHODAS II modified for use in the *World Mental Health Surveys* with the addition of filter items in different subscales. Internal consistency and validity of the modified WHODAS II are generally supported, but the use of filter questions impairs measurement properties of the instrument.

The most comprehensive psychometric analysis conducted, to date, on the WHODAS II is the work of Pösl *et al.* (2007), from a doctoral thesis, unpublished, of M. Pösl (2004), under the direction of G. Stucki, University of Monaco. The Authors evaluated the usefulness of the WHODAS II for measuring functioning and disability in patients with musculoskeletal diseases, internal diseases, stroke, breast cancer, and depressive disorder. The

validation of the German version of the WHODAS II was conducted in a sample of 904 patients from 19 rehabilitation centers and clinics in Bavaria. There was, among other things, a convergent validity with the SF-36. The conclusions of the study confirm the structure of six domains of the WHODAS II; furthermore, the instrument appears reliable and valid, and shows a sensitivity to change similar to that of the SF-36 in the corresponding subscales.

Given all the studies mentioned above, the WHODAS II was translated into the following languages: Italian (Federici *et al.*, 2003; Annicchiarico *et al.*, 2004; ESEMeD/MHEDEA 2000 investigators, 2004; Federici *et al.*, 2009), English (Janca *et al.*, 1996; Goyal & Kulkarni, 2002; Alexopoulos *et al.*, 2003; Chwastiak & Von Korff, 2003; Kessler *et al.*, 2003; MaGPIe Research Group, 2003; Pyne J.M., Sullivan *et al.*, 2003; Baumgartner, 2004; Chopra *et al.*, 2004; ESEMeD/MHEDEA 2000 investigators, 2004; Gallagher & Mulvany, 2004; McKibbin *et al.*, 2004; MaGPIe Research Group, 2004; Baron *et al.*, 2005; Chisolm *et al.*, 2005; McArdle *et al.*, 2005; Mubarak, 2005; Von Korff *et al.*, 2005; Perini *et al.*, 2006; Roth *et al.*, 2006; Scott *et al.*, 2006; Wang *et al.*, 2006; Baron *et al.*, 2008; Hudson *et al.*, 2008), Swedish (Pettersson *et al.*, 2006), Dutch (van Tubergen *et al.*, 2003; ESEMeD/MHEDEA 2000 investigators, 2004;), German (Kemmler *et al.*, 2003; Stucki & Sigl, 2003; ESEMeD/MHEDEA 2000 investigators, 2004; Pösl, 2007; Schlote *et al.*, 2008), Korean (Yoon *et al.*, 2004; Kim *et al.*, 2005), Polish (Pyszel *et al.*, 2006), Norwegian (Soberg *et al.*, 2007), Turkish (Ulug *et al.*, 2001; Ertugrul & Ulug, 2004; Donmez *et al.*, 2005), Spanish (Lastra *et al.*, 2000; Vázquez-Barquero *et al.*, 2000; Matías-Carrelo *et al.*, 2003; ESEMeD/MHEDEA 2000 investigators, 2004), French (Norton *et al.*, 2004; ESEMeD/MHEDEA 2000 investigators, 2004; Bonnewyn *et al.*, 2005), Arabic (Badr *et al.*, 2007). Korean, Polish and Swedish translations are not provided by WHO (WHO, 2004).

In conclusion, the review of international literature on the WHODAS shows a broad consensus on the reliability and validity of the instrument, although the lack of standardized scores for the different translations of the WHODAS and the scarcity of particularly thorough studies does not guarantee that the cultural and psychometric requirements have been met by the instrument.

4. Characteristics of the Italian version of the WHODAS II

The study of Federici *et al.* had as general aim to provide a contribution to the validation of the Italian version of the WHODAS II, considering the widespread consent about the usefulness of the tool. Specifically, the Authors wanted to test if the WHODAS II can be regarded as a reliable instrument to assess the functioning and the self-perception of disability in persons with normal abilities and disabled participants, by the means of the analysis of some psychometric characteristics such as the reliability (inter-

nal homogeneity, Cronbach's Alpha) and the validity (principal components analysis).

The Italian version of the WHODAS II has been adapted by the Authors in the same format as the English one (*36-Item Interviewer Administered, Day Codes Version – February 2000*), because this was the most recent version of the instrument. The Authors have deleted the Italian items of the sections 3 and 5, since they were not further included in the last format of the English version.

The WHODAS II was administered to a sample of 500 participants (185 males and 315 females,) divided into two sub-samples: 271 normal adults and 229 disabled adults. Moreover, the disabled participant group comprised 111 motor disabled, 45 mental disabled and 73 sensory disabled. The findings obtained show a good correspondence with the original structure of the WHODAS II. Furthermore, the internal consistency of most subscales, estimated by means of the Cronbach's Alpha, was found to be high in the examined sample. Regarding the factorial structure of the instrument, the results confirm the presence of six main factors, according to the six activity domains expected to be assessed by the WHODAS II.

The study of Federici et al. presents, however, some limitations: first, the three subgroups of disabled do not match each other for participant number, age and sex; moreover, the enrolment of mental disabled respondents ran into difficulties because it was not easy to access the centres for mental disabled in Italy. Finally, neither the convergent validity nor the reliability test – re-test of the instrument- has been studied. A research prosecution is therefore desirable which proposes, among other things, achieving standard scores for each macro-category of disability. Normative scores of disability would be useful to integrate the self-evaluation of a single individual regarding his/her functioning in a specific context. Indeed, by comparing the disability self-evaluation of a single individual to standard scores it will be possible to assess how much each factor of the biopsychosocial determinants of the individual's functioning influences the disability self-evaluation of that person.

5. Conclusions

The WHODAS II is a tool for the self-evaluation of limitations in activities and restrictions in participation experienced by an individual, independently from a medical diagnosis. The self- evaluation of the instrument appears a fundamental element compared to tests or questionnaires traditionally used for the assessment of disability, which usually reveal the point of view of the caregiver or clinician who compiles them. The revolution in the conception of disability, functioning and health represented by the biopsychosocial model and the new International Classification (ICF), con-

ceptually compatible with it, reveals the absolute priority of an individual subjective perspective, compared to any other etiopathological assessment, both the objective and reducing-individual-to-object point of view of the clinician.

The increasingly widespread utilization of the bio-psycho-social model at international level and the simultaneous promotion of the use of the new classification, have brought, in recent years, even increasing use of the new assessment tools, above all WHODAS II. This has involved, first, the need to accurately analyze the psychometric properties of the instrument, and in particular its reliability, stability, internal consistency, convergent validity and factorial structure.

This study has reviewed all studies published (until 2008) in the major scientific search engines, where has described the use and/or validation of WHODAS II. Research conducted identified 54 studies: 51 articles in international journals, 2 included in conferences and a doctoral dissertation. Of these, only six articles were published in journals or acts of conferences whose main object of interest is disability and rehabilitation. All studies considered have assessed the degree of correlation between the scores of the WHODAS II and the scores obtained by subjects on rating scales related to: depression, pain, schizophrenia and other psychotic disorders, quality of life, sleep disorders, diabetes, ageing, rheumatic disorders, anxiety disorders. All studies reviewed agree that the WHODAS II is an useful instrument for the assessment of disability, functioning and social participation, suggesting quite often to join the administration with scales used for measuring quality of life (eg.: SF-36 or WHQOL-BREF). Among the 51 articles only eight, however, have investigated the psychometric properties of the instrument, concluding, almost unanimously, that the psychometric properties of the WHODAS II allow it to be considered a valid and reliable instrument for the assessment of disability.

Among the main limitations that this review has helped to highlight, it is important to note that, to date, there are no standardized scores for the various translations of the WHODAS and that the number of studies that sought to investigate in detail the psychometric properties of the tool is particularly limited. Therefore, it would be desirable not only to universalize the tool, but also to deepen the studies conducted so far, in order to determine more precisely the advantages and limitations of WHODAS II.

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