

Acta Med. Okayama, 2021  
Vol. 75, No. 3, pp. 315-322

Copyright©2021 by Okayama University Medical School.

Acta Medica  
Okayama

<http://escholarship.lib.okayama-u.ac.jp/amo/>

Original Article

## Validity and Reliability of the Japanese Version of the 12-item Self-administered World Health Organization Disability Assessment Schedule (WHODAS) 2.0 in Patients with Schizophrenia

Riho Wada<sup>a</sup>, Masaki Fujiwara<sup>b\*</sup>, Yuto Yamada<sup>a,c</sup>, Naoki Nakaya<sup>d,e</sup>,  
Maiko Fujimori<sup>f,g</sup>, Ryuhei So<sup>h</sup>, Masafumi Kodama<sup>h</sup>, Yuji Higuchi<sup>i</sup>,  
Kyoko Kakeda<sup>j</sup>, Yosuke Uchitomi<sup>k,l,m</sup>, Norihito Yamada<sup>a</sup>, and Masatoshi Inagaki<sup>n</sup>

*Department of Neuropsychiatry, <sup>a</sup>Okayama University Graduate School of Medicine, Dentistry and Pharmaceutical Sciences, <sup>b</sup>Okayama University Hospital, Okayama 700-8558, Japan, <sup>c</sup>Sekizen Hospital, Tsuyama, Okayama 708-0883, Japan, <sup>d</sup>Department of Health Sciences, Saitama Prefectural University, Koshigaya-shi, Saitama 343-8540, Japan, <sup>e</sup>Department of Preventive Medicine and Epidemiology, Tohoku Medical Megabank Organization, Tohoku University, Sendai 980-8573, Japan, Divisions of <sup>f</sup>Health Care Research, Behavioral Sciences and Survivorship Research Group, <sup>g</sup>Cohort Consortium Research, Epidemiology and Prevention Group, Center for Public Health Sciences, <sup>m</sup>Center for Public Health Sciences, National Cancer Center, <sup>k</sup>Innovation Center for Supportive, Palliative and Psychosocial Care, <sup>i</sup>Department of Psycho-Oncology, National Cancer Center Hospital, Chuo-ku, Tokyo 104-0045, Japan, <sup>h</sup>Okayama Psychiatric Medical Center, Okayama 700-0915, Japan, <sup>j</sup>Care of Your Mind, Taiyo Hills Hospital, Takahashi City, Okayama 716-0061, Japan, <sup>l</sup>Department of Neuropsychiatry, Kochi Medical School, Kochi University, Nankoku, Kochi 783-8505, Japan, <sup>n</sup>Department of Psychiatry, Faculty of Medicine, Shimane University, Izumo, Shimane 693-8501, Japan*

It is necessary to assess functional impairment when treating schizophrenia. The World Health Organization Disability Assessment Schedule 2.0 (WHODAS 2.0) has been adopted as a measure of functional disability in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition. This study was a secondary analysis from a cross-sectional study of health-related behaviors among patients with schizophrenia. We examined the validity and reliability of the Japanese version of the 12-item WHODAS 2.0 when self-administered by such patients. Participants were 350 outpatients with schizophrenia from a psychiatric hospital. The standard six-factor structure of the WHODAS 2.0 showed a good fit for these participants. The Cronbach's alpha coefficient was 0.858, showing good internal consistency. The WHODAS 2.0 showed moderate correlations with the modified Global Assessment of Functioning and Kessler 6 scales ( $r = -0.434$  and  $0.555$ , respectively). The results of this study show that the Japanese version of the 12-item self-administered WHODAS 2.0 has good internal consistency and convergent validity among patients with schizophrenia. Further exploration of the usefulness of WHODAS 2.0 in clinical settings is needed.

**Key words:** disability, schizophrenia, validity, reliability, WHODAS 2.0

Schizophrenia is one of the most disabling psychiatric diseases [1,2]. Patients with schizophrenia develop cognitive impairment as well as positive and

negative symptoms. The cognitive impairment includes deficits in attention, learning, memory, and social cognition. These impairments mean that patients with schizophrenia experience varying levels of difficulty in

Received September 1, 2020; accepted December 7, 2020.

\*Corresponding author. Phone: +81-86-235-7242; Fax: +81-86-235-7246  
E-mail: [mfujiwara@okayama-u.ac.jp](mailto:mfujiwara@okayama-u.ac.jp) (M. Fujiwara)

Conflict of Interest Disclosures: No potential conflict of interest relevant to this article was reported.

daily life [2, 3]. In addition, some patients with schizophrenia whose psychotic symptoms have resolved have residual apparent functional impairment [2]. Therefore, both improvement of psychotic symptoms and functional recovery are emphasized in the treatment and rehabilitation of patients with schizophrenia.

The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) does not mention the Global Assessment of Functioning Scale (GAF), which had been used for the overall evaluation of function in psychiatric patients until the DSM-IV-TR. The GAF was ultimately excluded because it lacked conceptual clarity and quantifiable psychometrics [4]. Instead, the DSM-5 recommends using the World Health Organization Disability Assessment Schedule 2.0 (WHODAS 2.0) for functional evaluation [4]. The WHODAS 2.0 was developed by the WHO to provide a standardized method of measuring health and disability across various cultures and in the context of any kind of disease [5]. The WHODAS 2.0 assesses disability experienced in the last 30 days in 6 domains: Cognition, Mobility, Self-care, Getting along, Life activities, and Participation. Quantitative surveys have been conducted in diverse cultural environments, including among healthy individuals, and the WHODAS 2.0 has been shown to be highly sensitive to change regardless of the subject's social background [5]. The WHODAS 2.0 is available in a 12-item version and a 36-item version, and can be interview-administered, self-administered, or proxy-administered. The 36-item interview version can be administered in about 20 min and the 12-item interview version in about 5 min [5].

Previous studies from Spain, Turkey, and the United States have reported the validity and reliability of the 36-item version and a 32-item version (omitting four questions related to work/school) of the WHODAS 2.0 in patients with schizophrenia [6-8]. In these studies, the WHODAS 2.0 was reported to be valid and reliable, and to have appropriate scaling characteristics to assess disability in patients with schizophrenia. Tazaki *et al.* developed a Japanese-language version of WHODAS 2.0 (WHODAS 2.0-J) based on the English version using a translation and back-translation process [9]. They then examined the validity and reliability of the Japanese scale in older people with and without disabilities. However, to our knowledge, no reports have examined the validity and reliability of the WHODAS 2.0-J in patients with mental disorders,

including schizophrenia. The 12-item self-administered version of the WHODAS 2.0 is easy to use in everyday clinical settings and would thus be a useful measure in this context if it proves valid and reliable in such populations. Therefore, the purpose of this study was to investigate the validity and reliability of the 12-item WHODAS 2.0-J (WHODAS 2.0-J-12) among patients with schizophrenia.

## Materials and Methods

**Research design.** This study was a preplanned secondary analysis of the Study of Health Behavior in People with Schizophrenia (SHEAPS). The SHEAPS was a cross-sectional study enrolled in the UMIN Clinical Trials Registry (UMIN000023874). The primary objective of the SHEAPS was to investigate cancer screening and smoking behaviors among people with schizophrenia. The secondary objective of the SHEAPS was to investigate the validity and reliability of the WHODAS 2.0-J-12 among patients with schizophrenia. Detailed methods of the SHEAPS were described in our previous paper [10].

**Setting.** SHEAPS participants were recruited from the outpatient department of the Okayama Psychiatric Medical Center. Located in the downtown area of Okayama City, this center provides outpatient and inpatient services for both acute and chronic patients with mental disorders. With 252 beds and approximately 250 outpatient visits per day, it is a core psychiatric hospital in Okayama prefecture.

**Research subjects.** 1. Selection Criteria. We recruited patients who met all our inclusion criteria as of April 1, 2016. The inclusion criteria were: 1) aged 20-69 years; 2) visited the Okayama Psychiatric Medical Center for at least 1 year, and visited the hospital at least twice in the last 6 months as their primary psychiatric outpatient service; and 3) diagnosed by their current primary psychiatrists with schizophrenia or schizoaffective disorder (but not other schizophrenia spectrum disorders) according to the DSM-5 [4].

2. Exclusion Criteria. We excluded patients who: 1) had comorbid intellectual disabilities and could not answer the questionnaire; 2) had severe psychiatric symptoms such that study participation was judged inappropriate by their primary psychiatrists; 3) had a severe physical condition such that study participation was judged inappropriate by their primary psychia-

trists; and 4) could not read or write Japanese.

**3. Procedure.** In accordance with the eligibility criteria, 680 patients were identified in advance as potential participants from their electronic medical records. Then, 420 patients were randomly extracted from the pool of 680 patients using computer-generated random numbers. In total, 420 subjects were invited to participate in SHEAPS from September to November 2016. Most subjects were asked to participate at the time of their outpatient visit. The researcher provided support as needed for participants when responding to the questionnaire. If participants had an attendant, they were instructed to answer the question themselves to avoid proxy-administered responses. Those who could not be contacted in this manner were contacted by telephone and mail and invited to participate to increase the participation rate.

**Variables.** The following variables were collected using the questionnaire and participants' medical records. The questionnaire was self-administered, but a researcher was available to support participants in answering the questionnaire as needed.

**1. Demographic Variables.** Gender and age were drawn from participants' medical records. Educational level (junior high school or below, high school, junior/vocational college, and university/college or above), employment status (regular employee, other employment above minimum wage, self-employed, and unemployed), marital status (married and unmarried), and living status (living alone, living with family, and living in a facility) were extracted from the questionnaire responses.

**2. WHODAS 2.0 (12-item version, self-administered).** The 12-item self-administered version of the WHODAS 2.0 comprises 2 questions in each of the six domains (Cognition, Mobility, Self-care, Getting along, Life activities, and Participation). The WHODAS 2.0 assesses disability over the last 30 days. Items are scored on a 5-point scale ranging from 0 = none to 4 = extreme/cannot do. The scores are summed to give a total score (0-48 points). In this study, we used the WHODAS 2.0-J-12 developed by Tazaki *et al.* [9].

**3. GAF.** The GAF evaluates an individual's overall level of functioning including psychiatric symptoms and occupational and social functioning on a scale from 0 to 100 [11]. Both the severity of mental symptoms and the severity of social and occupational functioning are assessed, and the lower score is adopted as the GAF

score. The modified GAF (mGAF) was developed by Hall and has more detailed criteria and a more structured scoring system [12]. In this study, we used the Japanese version of the mGAF developed by Eguchi *et al.* [13].

**4. K6.** The K6 is a screening tool for evaluating nonspecific psychological distress, including anxiety and depression [14]. It comprises 6 questions that assess psychological distress in the past 30 days. The total possible scores range from 0 to 24, with a higher score reflecting more severe psychological distress. The Japanese version of the K6 was developed using a back-translation method and has been validated in people aged 20 years or older [15].

**Sample size.** The number of participants in this study was set at 420 and the study participation rate was estimated at 60%. The maximum number of participants that could be recruited within the period of this study was 420.

**Ethical approval.** This study was approved by the Okayama University Graduate School of Medicine, Dentistry and Pharmaceutical Sciences and Okayama University Hospital (receipt number KEN1608-010), and by the Okayama Psychiatric Medical Center (receipt number 27-38). Potential participants were informed that they could refuse or withdraw from participation in the study at any time. All participants provided informed written consent before the study started.

**Statistical analysis.** This study used SPSS version 22 (IBM, Tokyo) for the data analyses. The significance level was set at  $p < 0.05$ . Patients with missing values were not excluded from analyses, which were conducted using all available information. Distribution of WHODAS 2.0-J-12 scores was evaluated by obtaining the mean, standard deviation (SD), and percentage of patients for each score (score of 0 points as a floor effect, and a score of 4 points as a ceiling effect). The fit of the standard six-factor structure model in this sample was evaluated by confirmatory factor analysis using SPSS Amos [5]. The chi-squared value, degrees of freedom, goodness of fit index (GFI), adjusted goodness of fit index (AGFI), comparative fit index (CFI), and root mean square error of approximation (RMSEA) were calculated to assess the fit of the model, with GFI  $\geq 0.95$ , AGFI  $\geq 0.90$ , CFI  $\geq 0.97$ , and RMSEA  $\leq 0.05$  considered to represent good fit [16]. Cronbach's alpha was calculated to assess internal consistency. In the

additional analysis, we calculated the Cronbach's alpha stratified by mGAF score (score  $\geq 51$  = mild to moderate disability vs. score  $\leq 50$  = severe disability) [17]. Spearman's rank correlation coefficients were calculated to evaluate the convergent validity between the WHODAS 2.0-J-12, the mGAF, and the K6. In this method, correlation coefficient values below 0.4 are considered weak, 0.4-0.7 are considered moderate, and  $>0.7$  are considered strong.

## Results

In total, 907 patients met the selection criteria. We excluded 227 patients: 73 with comorbid intellectual disabilities, 145 with psychiatric symptoms too severe to participate in this study, 2 with a physical status too severe to participate in this study, and 7 who were unable to read or write. The remaining 680 patients were pooled as potential study participants (Fig. 1). Of the 420 patients randomly selected from the pool of 680 patients, 350 (83.3%) participated in this study. Participants' background characteristics are shown in Table 1. Three participants who had visited a clinic

other than the study site at the time of this study answered the questionnaire by mail. Because these three participants did not visit the study site, their current mGAF score could not be assessed.

The WHODAS 2.0-J-12 score distribution is shown in Table 2. All 350 participants responded to the WHODAS 2.0-J-12 and there were no missing values. For each item, the proportion of participants who answered that they could do nothing at all (scored 4 points) was 0.0-18.9%. The proportion of participants who answered that there was no problem (scored 0 points) for each item was 41.4-95.4%.

Confirmatory factor analysis was performed for the standard six-factor domains. The model was rejected based on the chi-square test of model fit (110.519,  $df=39$ ,  $p<0.001$ ). The goodness of fit measures were: GFI=0.950, AGFI=0.900, CFI=0.951, and RMSEA (90% confidence interval)=0.072 (0.057-0.089). Regarding the internal consistency of the WHODAS 2.0-J-12, the Cronbach's alpha coefficient was 0.858. The Cronbach's alpha coefficients excluding any one item ranged from 0.839 to 0.858 and were smaller than the Cronbach's alpha coefficient for all 12 items. In the

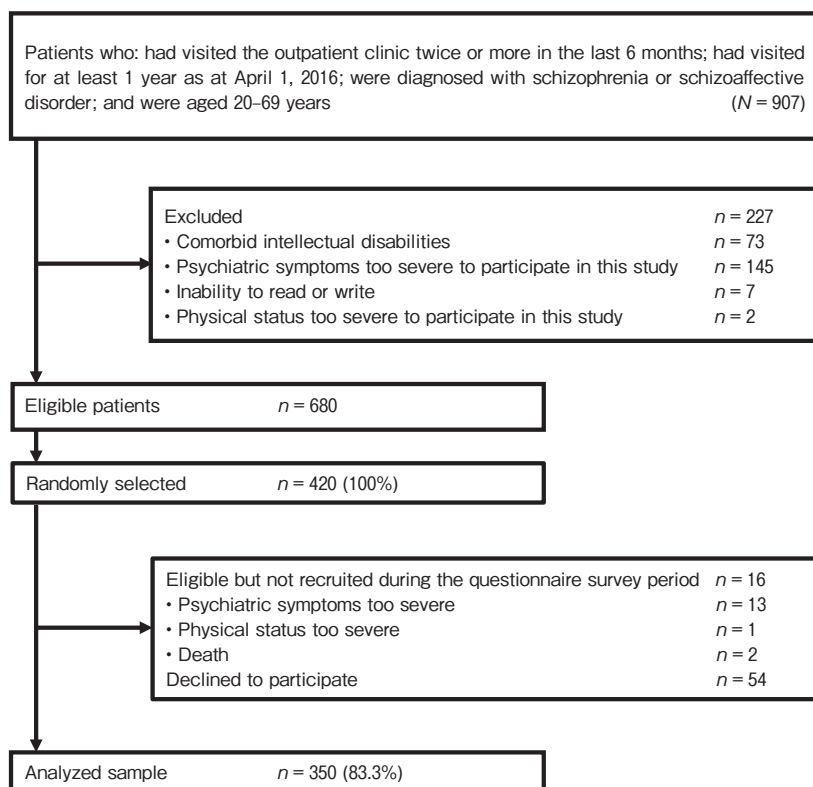


Fig. 1 Sampling flow.

**Table 1** Participant characteristics

	n	%	Mean ± SD	Range
Total	350			
Gender				
female	176	50.3		
Age, years				
20–29	44	12.6		
30–39	82	23.4		
40–49	98	28.0		
50–59	76	21.7		
60–69	50	14.3		
			44.9 ± 12.1	
Educational level				
≤ junior high school	47	13.4		
> junior high school but ≤ high school	155	44.3		
> high school but ≤ junior/vocational college	83	23.7		
≥ university or college	65	18.6		
Employment status				
Regular employee	32	9.1		
Other employment above minimum wage	93	26.5		
Self-employed	9	2.6		
Unemployed	216	61.7		
Marital status				
Married	87	24.9		
Unmarried	263	75.1		
Living status				
Living alone	78	22.3		
Living with family	268	76.6		
Facilities	4	1.1		
mGAF score (n = 347*)			53.1 ± 14.4	20–88
K6 score			5.8 ± 5.3	0–24

\*Three patients had transferred to a doctor at the time of the survey and could not be evaluated. mGAF, modified Global Assessment of Functioning; K6, Kessler 6 scale; SD, standard deviation.

**Table 2** Descriptive statistics for each item in the Japanese version of the 12-item self-administered World Health Organization Disability Assessment Schedule 2.0 (n = 350)

Item (Domain)	Mean	SD	Scored 0 (%)	Scored 1 (%)	Scored 2 (%)	Scored 3 (%)	Scored 4 (%)
S1 (Mobility)	0.67	1.12	66.3	14.9	8.6	6.3	4.0
S2 (Life activities)	0.63	1.01	62.0	23.1	8.6	2.3	4.0
S3 (Cognition)	1.07	1.32	48.6	21.4	13.1	7.7	9.1
S4 (Participation)	1.32	1.55	46.9	17.4	11.1	5.7	18.9
S5 (Participation)	1.02	1.07	41.4	27.7	20.9	8.3	2.0
S6 (Cognition)	0.38	0.82	77.4	12.6	6.0	2.9	1.1
S7 (Mobility)	0.87	1.28	60.9	13.1	10.6	9.1	6.3
S8 (Self-care)	0.20	0.67	89.7	4.3	3.4	1.4	1.1
S9 (Self-care)	0.07	0.39	95.4	2.9	0.6	1.1	0.0
S10 (Getting along)	0.64	0.98	62.6	19.1	12.6	3.4	2.3
S11 (Getting along)	0.68	1.09	63.1	18.9	8.9	5.1	4.0
S12 (Life activities)	1.22	1.47	49.1	16.6	10.6	10.9	12.9

SD, standard deviation.



additional analysis, the Cronbach's alpha coefficient for participants with mGAF scores  $\geq 51$  was 0.819 and that for those with scores  $\leq 50$  was 0.854.

The correlations between the WHODAS 2.0-J-12 and the mGAF and K6 are shown in Table 3. The WHODAS 2.0-J-12 was moderately correlated with the mGAF and K6 ( $r = -0.434$  and  $0.555$ , respectively). Among the WHODAS 2.0-J-12 domains, that of Life activities had a moderate correlation with the mGAF ( $r = -0.463$ ). The domains of Cognition, Getting along, Life activities, and Participation showed moderate correlations with the K6 ( $r = 0.432$ ,  $0.466$ ,  $0.505$ , and  $0.506$ , respectively).

### Discussion

To our knowledge, this was the first study to examine the validity and reliability of the WHODAS 2.0-J among patients with schizophrenia. The self-administered version of the WHODAS 2.0-J-12 showed good internal consistency in outpatients with schizophrenia. In addition, there was a moderate correlation with the mGAF, which is commonly used to assess disability, and the K6, which is a measure of depression and anxiety.

Although the self-administered version of the WHODAS 2.0-J-12 showed no ceiling effects, it showed floor effects in most items. In particular, most patients answered they had no problems in the two Self-care domain items: Washing your whole body (89.7%) and Getting dressed (95.4%). A study of patients with schizophrenia aged 18-55 years in Spain that used the

36-item interviewer-administered WHODAS 2.0 also reported a strong floor effect in the Self-care domain [6]. The WHODAS 2.0 may therefore not be sufficient to assess self-care in patients with schizophrenia because basic self-care may not be impaired.

The standard six-factor structure of the WHODAS 2.0 was rejected based on the chi-square test of model fit, but the model fit indices were within the acceptable or good range. Therefore, the model was shown to fit our sample. Guilera *et al.* reported that the six-factor model of the 36-item version of the WHODAS 2.0 showed good fit in patients with schizophrenia [6]. It is quite possible, then, that the 6-factor model in the WHODAS 2.0 may adequately explain the structure of the disability in patients with schizophrenia.

In this study, the Cronbach's alpha coefficient was 0.858, indicating good internal consistency. The Cronbach's alpha coefficient excluding any one item was smaller than that for all 12 items. In addition, the corrected-item total correlation was greater than 0.3 for all items [18]. These results showed that all items were necessary. A systematic review of studies examining the validity and reliability of the 12-item self-administered version of the WHODAS 2.0 reported Cronbach's alpha coefficients of 0.85-0.95 for the general population [19]. To our knowledge, no previous studies have examined the internal consistency of the 12-item version of the WHODAS 2.0 among patients with schizophrenia. For the 36-item interviewer-administered WHODAS 2.0, a previous Spanish study reported a Cronbach's alpha coefficient of 0.94 [6]. Therefore, the WHODAS 2.0 may be a reliable measure in patients with schizophrenia. In addition, the Cronbach's alpha value stratified by mGAF score showed that the WHODAS 2.0-J-12 had good internal consistency, even in patients with severe symptoms and functional impairment. This result suggested that the WHODAS 2.0-J-12 may be used regardless of case severity.

The self-administered version of the WHODAS 2.0-J-12 showed a moderate correlation with the mGAF. A previous study by Gspandl *et al.* reported that the correlation between the interview-administered WHODAS 2.0 and GAF (score multiplied by  $-1$ ) in outpatients with schizophrenia was  $r = 0.67$  [20]. As our study used a self-administered version of the WHODAS 2.0, it might be expected that the correlation observed in our study would be slightly weaker than that in the previous study by Gspandl *et al.* In terms of the correlation

**Table 3** Correlations of the Japanese version of the 12-item self-administered WHODAS 2.0 with the mGAF and K6

	mGAF	K6
Total WHODAS 2.0 score	-0.434**	0.555**
Domain		
Cognition	-0.297**	0.432**
Mobility	-0.329**	0.227**
Self-care	-0.171*	0.185**
Getting along	-0.242**	0.466**
Life activities	-0.463**	0.505**
Participation	-0.313**	0.506**

mGAF, modified Global Assessment of Functioning; K6, Kessler 6 scale; WHODAS, World Health Organization Disability Assessment Schedule.

\* $p < 0.01$ , \*\* $p < 0.001$ .

between each WHODAS 2.0-J-12 domain and the mGAF, Life activities showed a higher correlation with the mGAF than other domains. This was a reasonable result, because the Life activities items are similar to the social functions assessed by the mGAF. However, in this study, it was unclear whether the WHODAS 2.0-J-12 was more strongly correlated with either psychiatric symptoms or social functions as reflected by the mGAF.

We found the self-administered version of the WHODAS 2.0-J-12 showed a relatively strong correlation with the K6. In particular, the WHODAS 2.0-J-12 domains of Cognition, Getting along, Life activities, and Participation showed moderate correlations with the K6 (Table 3). However, the domains of Mobility and Self-care showed low correlations with the K6. This was consistent with the results of previous studies that examined the correlation between the WHODAS 2.0 and depression as assessed by the Hamilton Depression Rating Scale [6,8]. It is reasonable that correlations between depression and Mobility or Self-care, which primarily evaluate physical disabilities, were lower compared with other domains. Depression in schizophrenia has been reported to be associated with worse daily functioning except for physical functioning, and with health-related quality of well-being [21]. Although the present study cannot address the causal relationship between depression and functional impairment, patients with high depressive symptoms may not be able to adequately assess their own functional impairment. Therefore, it may be necessary to assess depression when evaluating functional impairment in patients with schizophrenia.

The present study had several limitations. First, this study only evaluated the self-administered version of the WHODAS 2.0-J-12; the validity and reliability of other Japanese versions is unknown in patients with schizophrenia. Second, this study only used the mGAF and K6 to examine convergent validity. Third, we did not assess the test-retest reliability and discriminant validity. Fourth, this was a single-center study, which limited the generalizability of the results. However, our study participants included patients with a range of severity, and the results of this study may be applicable to outpatients with schizophrenia and those in general psychiatric hospitals. Fifth, outpatients with very severe symptoms were excluded from this study, which might have resulted in selection bias. The self-administered version of the WHODAS 2.0 may be less valid and reliable in

more severe patients as they may be unable to adequately assess their own disability. There may have been a further selection bias in that only those who chose to participate in the study could be included in the analysis.

This study suggested that the self-administered version of the WHODAS 2.0-J-12 had good internal consistency and convergent validity in patients with schizophrenia. However, some items (*e.g.*, those included in the Self-care domain) with a strong floor effect may be less relevant for assessing disability related to schizophrenia. Further research and practice are needed to determine whether this scale is useful in treating and rehabilitating patients with schizophrenia in clinical practice.

**Acknowledgments.** We thank our research assistant Ms. Kimiko Takaoka, who helped conduct the questionnaire survey, Ms. Megumi Miki, who assisted with data management, Ms. Shoko Yoshimoto, who supported our study with logistics assistance, and all the outpatient service staff at the Okayama Psychiatric Medical Center. We also thank Audrey Holmes, MA, from Edanz Group (<https://en-author-services.edanzgroup.com/ac>) for editing a draft of this manuscript.

This study was supported by the Okayama Health Foundation, Novartis Pharma Research Grants, and Research for Promotion of Cancer Control Programs (H26-political-general-002). These sources had no further role in the study design; the collection, analysis, and interpretation of data; the writing of the report; or the decision to submit the paper for publication.

## References

1. Murray CJ and Lopez AD: Global mortality disability and the contributions of risk factors: global burden of disease study. *Lancet* (1997) 349: 1436–1442.
2. Harvey PD and Bellack AS: Toward a terminology for functional recovery in schizophrenia: is functional remission a viable concept? *Schizophr Bull* (2009) 35: 300–306.
3. Harvey PD and Strassnig M: Predicting the severity of everyday functional disability in people with schizophrenia: cognitive deficits, functional capacity, symptoms, and health status. *World Psychiatry* (2012) 11: 73–79.
4. American Psychiatric Association: Diagnostic and Statistical Manual, Fifth Edition; DSM-5. American Psychiatric Association, Washington DC (2013).
5. Üstün TB, Kostanjsek N, Chatterji S and Rehm J: Measuring health and disability: manual for WHO Disability Assessment Schedule (WHODAS 2.0). World Health Organization, Geneva (2010).
6. Guilera G, Gómez-Benito J, Pino O, Rojo JE, Cuesta MJ, Martínez-Arán A, Safont G, Tabarés-Seisdedos R, Vieta E, Bernardo M, Crespo-Facorro B, Franco M and Rejas J: Utility of the World Health Organization Disability Assessment Schedule II in schizophrenia. *Schizophr Res* (2012) 138: 240–247.
7. Uluğ B, Ertugrul A, Gogus A and Kabakci E: Reliability and validity of the Turkish version of the World Health Organization Disability

- Assessment Schedule-II (WHO-DAS-II) in schizophrenia. *Turk Psikiyatri Derg* (2001) 12: 121–130.
8. McKibbin C, Patterson TL and Jeste DV: Assessing disability in older patients with schizophrenia: results from the WHODAS-II. *J Nerv Ment Dis* (2004) 192: 405–413.
  9. Tazaki M, Yamaguchi T, Yatsunami M and Nakane Y: Measuring functional health among the elderly: Development of the Japanese Version of the World Health Organization Disability Assessment Schedule II. *Int J Rehabil Res* (2014) 37: 48–53.
  10. Fujiwara M, Inagaki M, Nakaya N, Fujimori M, Higuchi Y, Hayashibara C, So R, Kakeda K, Kodama M, Uchitomi Y and Yamada N: Cancer screening participation in schizophrenic outpatients and the influence of their functional disability on the screening rate: A cross-sectional study in Japan. *Psychiatry Clin Neurosci* (2017) 71: 813–825.
  11. American Psychiatric Association: Diagnostic and Statistical Manual, Fourth Edition, Text-Revision; DSM-IV-TR. American Psychiatric Association, Washington DC (2000).
  12. Hall RC: Global assessment of functioning. A modified scale. *Psychosomatics* (1995) 36: 267–275.
  13. Eguchi S, Koike S, Suga M, Takizawa R and Kasai K: Psychological symptom and social functioning subscales of the modified Global Assessment of Functioning scale: reliability and validity of the Japanese version. *Psychiatry Clin Neurosci* (2015) 69: 126–127.
  14. Kessler RC, Barker PR, Colpe LJ, Epstein JF, Gfroerer JC, Hiripi E, Howes MJ, Normand SL, Manderscheid RW, Walters EE and Zaslavsky AM: Screening for serious mental illness in the general population. *Arch Gen Psychiatry* (2003) 60: 184–189.
  15. Furukawa TA, Kawakami N, Saitoh M, Ono Y, Nakane Y, Nakamura Y, Tachimori H, Iwata N, Uda H, Nakane H, Watanabe M, Naganuma Y, Hata Y, Kobayashi M, Miyake Y, Takeshima T and Kikkawa T: The performance of the Japanese version of the K6 and K10 in the World Mental Health Survey Japan. *Int J Methods Psychiatr Res* (2008) 17: 152–158.
  16. Schermelleh-Engel K, Moosbrugger H and Müller H: Evaluating the fit of structural equation models: tests of significance and descriptive goodness-of-fit measures. *Method Psychol Res Online* (2003) 8: 23–74.
  17. Ruggeri M, Leese M, Thornicroft G, Bisoffi G and Tansella M: Definition and prevalence of severe and persistent mental illness. *Br J Psychiatry* (2000) 177: 149–155.
  18. Polit DF, Beck CT and Owen SV: Is the CVI an acceptable indicator of content validity? Appraisal and recommendations. *Res Nurs Health* (2007) 30: 459–467.
  19. Saltychev M, Katajapuu N, Bärlund E and Laimi K: Psychometric properties of 12-item self-administered World Health Organization Disability Assessment Schedule 2.0 (WHODAS 2.0) among general population and people with non-acute physical causes of disability —systematic review. *Disabil Rehabil* (2019) 23: 1–6.
  20. Gspandl S, Peirson RP, Nahhas RW, Skale TG, Skale TG and Lehrer DS: Comparing Global Assessment of Functioning (GAF) and World Health Organization Disability Assessment Schedule (WHODAS) 2.0 in schizophrenia. *Psychiatry Res* (2017) 259: 251–253.
  21. Jin H, Zisook S, Palmer BW, Patterson TL, Heaton RK and Jeste DC: Association of depressive symptoms and functioning in schizophrenia: A study in older outpatients. *J Clin Psychiatry* (2001) 62: 797–803.