



## Psychometric properties of the Spanish version of the Opening Minds Scale for Health Care Providers (OMS-HC) in nursing students

Concepción Martínez-Martínez<sup>a</sup>, Vanessa Sánchez-Martínez<sup>a,\*</sup>, María C. Fuentes<sup>b</sup>,  
Rocío Juliá-Sanchis<sup>c</sup>, Juan Diego Ramos-Pichardo<sup>d</sup>

<sup>a</sup> Department of Nursing, University of Valencia Spain

<sup>b</sup> Department of Methodology of the Behavioral Sciences, Faculty of Psychology, University of Valencia Spain

<sup>c</sup> Nursing Department of the Faculty of Health Science, University of Alicante Spain

<sup>d</sup> Department of Nursing, University of Huelva Spain

### ARTICLE INFO

#### Keywords:

Mental disorders  
Nursing students  
Psychometric properties  
Stigma  
Surveys and questionnaires

### ABSTRACT

**Aims:** To culturally adapt the OMS-HC and examine its psychometric properties in a sample of nursing students in Spain.

**Design:** A cross-sectional validation study design

**Methods:** The original scale was translated and adapted following the International Test Commission guidelines for translating and adapting tests. The reliability was measured using the ordinal alpha method. The factor structure was determined by Confirmatory Factor Analysis (CFA). A CFA was performed using the Diagonally Weighted Least Squares (DWLS) estimation method for ordinal data with robust standard errors. Convergent validity was assessed using Spearman's rank correlation coefficients between the OMS-HC scale and the Level of Contact Report.

**Results:** A total of 747 nursing students participated in the study. The Spanish version tested on nursing students included 15 items and the factorial structure was one-dimensional. This model obtained a good fit for both the absolute and the incremental fit indices. Convergent validity results showed a negative correlation between the level of contact report and scores on the one-dimensional version of the OMS-HC-15 items. The reliability was acceptable, as reflected by the ordinal alpha.

**Conclusion:** The OMS-HC has adequate psychometric properties in Spanish nursing students. This questionnaire may be useful for measuring a single aspect, namely stigma.

**Implications for the profession:** Its relevance lies in the possibility for instructors to measure changes in stigma following educational or awareness-raising interventions to ensure that people with mental disorders receive better healthcare.

### 1. Introduction

Stigma towards mental disorders have pernicious effects on the healthcare received by people with a psychiatric diagnosis and have been found to act as a barrier to those affected actively seeking help (Corrigan, 2004; Schnyder et al., 2017; Valery and Prouteau, 2020). Furthermore, the healthcare provided by mental health staff is defined by their stereotypes and prejudices (Nóbrega et al., 2021; Shahif et al., 2019). The desire of health professionals to avoid contact leads them to question the veracity of symptomatology, or to attribute it to the mental

disorder itself or the adverse effects of treatment, thereby limiting the attribution of symptoms to a physical health disorder (Martínez-Martínez et al., 2021). People with a psychiatric diagnosis have more limited access to regular cancer screenings and their follow-up of respiratory, cardiac and metabolic disorders is poorer than that received by the general population (Corrigan, 2004; Ljungberg et al., 2016; Nielsen et al., 2021; Schnyder et al., 2017; Valery and Prouteau, 2020). Studies undertaken in various European countries show that some of the direct consequences are higher mortality rates for cardiac, respiratory and metabolic disorders, leading to a reduction in

\* Correspondence to: Av. Menéndez y Pwlayo nº 19, Valencia 46010, Spain.

E-mail addresses: [concepcion.martinez-martinez@uv.es](mailto:concepcion.martinez-martinez@uv.es) (C. Martínez-Martínez), [vanessa.sanchez@uv.es](mailto:vanessa.sanchez@uv.es) (V. Sánchez-Martínez), [maria.c.fuentes@uv.es](mailto:maria.c.fuentes@uv.es) (M.C. Fuentes), [rjulia@ua.es](mailto:rjulia@ua.es) (R. Juliá-Sanchis), [juan.ramos@denf.uhu.es](mailto:juan.ramos@denf.uhu.es) (J.D. Ramos-Pichardo).

<https://doi.org/10.1016/j.nepr.2025.104469>

Received 13 March 2025; Received in revised form 30 June 2025; Accepted 5 July 2025

Available online 11 July 2025

1471-5953/© 2025 The Author(s). Published by Elsevier Ltd. This is an open access article under the CC BY-NC license (<http://creativecommons.org/licenses/by-nc/4.0/>).

life expectancy of between 10 and 20 years compared with the general population (Jayatilleke et al., 2017; Nordentoft et al., 2013).

From the perspective of social psychology, the construct of stigma consists of three interrelated dimensions: stereotypes as a cognitive component, attitudes as an emotional component and discrimination as an attitudinal component (Thornicroft et al., 2007). However, the number of definitions and models has proliferated in recent years due to increasing research on stigma in different situations and disorders.

In the specific case of mental disorders, there are currently several models that attempt to explain the mechanisms by which stigmatization occurs in this group. The model developed by Link and Phelan (2001) explains the stigmatization process by means of five components: labelling, stereotypes, separation, loss of status and discrimination, all of which occur due to a position of power on the part of the stigmatising group.

Pescosolido et al. (2008) developed the Framework Integrating Normative Influences on Stigma (FINIS). This model aims to explain the stigmatized group's reasons, intentions and emotions and the consequences for the group. Corrigan et al. (2003) proposed the Attribution Model of Public Discrimination towards Persons with Mental Illness, in which they analysed the components of stigma, the relationship between the person's responsibility for the mental disorder and stigma and the modulating role of risk and familiarity on the latter. This profusion of models and the fact that there is no operationalized and widely accepted definition has contributed to the existence of numerous questionnaires to measure stigma, making it extremely difficult to measure this construct in a uniform manner (Fox et al., 2018).

The Opening Minds Scale for Health Care Providers (OMS-HC) is one of the questionnaires available. Its characteristics have contributed to its increased use in understanding stigma among healthcare providers. The OMS-HC questionnaire is simple, current and brief. It has three dimensions: Attitudes, Disclosure/Seeking Help and Social Distance. It also permits calculation of the total score. It was developed in Canada for the Open Mind Stigma campaign. The first version contained 20 items in two dimensions () which were eventually reduced to 15 items (Modgill et al., 2014). It has been widely used in healthcare settings in various countries including Germany, Hungary, Italy, Chile, Singapore, Pakistan, Mexico, Brazil and Portugal, with optimal psychometric properties (Carrara et al., 2023; Chang et al., 2017; Destrebecq et al., 2018; Ori et al., 2020; Sapag et al., 2019; Valdivia Ramos et al., 2023; Zuaboni et al., 2021; Moreira et al., 2024).

If the OMS-HC were available for Spanish nursing students, we could use this easily administered and interpreted instrument and determine whether the awareness-raising and educational activities carried out with the students contribute to reducing stigma among them. We also wanted to compare the scores with those obtained in other contexts. We therefore set out to culturally adapt the OMS-HC and examine its psychometric properties in a sample of nursing students in Spain.

## 2. Materials and methods

### 2.1. Design and sample

This is a cross-sectional validation study where nursing students from four different nursing faculties in Spanish universities participated. Data were collected through self-administered questionnaires and convenience sampling was applied. At the beginning of the semester, before the Mental Health Nursing subject was taught, the researchers informed the participants about the study and invited them to participate. The inclusion criteria were: nursing students in their second or third year who were fluent in Spanish.

### 2.2. Ethics

This study was conducted according to the ethical principles for medical research involving human subjects described in the Declaration

of Helsinki (World Medical Association, 2013) and Spanish data protection regulations. The study was approved by the Human Research and Ethics Committee of the University of XXX (procedure number H155134600554). The data were collected through an anonymous questionnaire, which included the participants' informed consent. To ensure the anonymity of the data collection, the instruments were provided on separate sheets of paper of the informed consent form.

### 2.3. Instruments

#### 2.3.1. Sociodemographic data

A self-reported questionnaire was designed to collect the necessary sociodemographic data: age, gender, school year, diagnoses of friends or relatives with mental disorders and level of familiarity with the mental disorder.

#### 2.3.2. OMS-HC (Open minds scale for health care providers)

The OMS-HC is a self-administered questionnaire, multidimensional in its original form, with a design which allows the total score to be obtained. The scale was created to measure the effectiveness of the contact education sessions of the Open Minds Programme, which was developed in Canada. Its three dimensions are measured using a 5-point Likert scale, with 1 representing total disagreement and 5 total agreement, except for items 2, 6, 7, 8 and 14, which have inverse coding. Higher scores reveal more stigmatizing attitudes, with 15 being the minimum and 75 the highest score. The internal consistency of the original scale is acceptable for the three-dimensional structure ( $\alpha = .67$  to  $\alpha = .68$ ) (Modgill et al., 2014).

#### 2.3.3. The level of contact report

This questionnaire was used to measure the participants' previous contact or familiarity with mental disorders. It was developed through an expert panel consultation (Holmes et al., 1999) and has been widely used in other studies (Corrigan et al., 2001; Porfyri et al., 2023). The questionnaire describes 12 possible situations expressing different levels of contact with people with mental disorders, with level 1 being the lowest ("I have never observed a person whom I knew had a mental disorder") and level 12 the highest ("I have a mental disorder").

### 2.4. Spanish open mind scale adaptation

#### 2.4.1. Cultural and language adaptation

Cultural differences between the country of origin and the target country were considered in the linguistic adaptation process. Instead of being limited to a literal translation, the language used conveyed the original meaning and was easily understood.

#### 2.4.2. Back translation

The original scale was translated and adapted following the International Test Commission guidelines for translating and adapting tests (Commission International Test, 2017). The back translation method was used, with the participation of four nursing students who were bilingual in English and Spanish.

#### 2.4.3. Proof of interpretability

Based on the translations, the first version of the questionnaire was obtained by consensus between two mental health nurses. This version was tested in a group comprised of participants like the population to which the scale was addressed. They were provided with the printed questionnaire. The participants did not report any problems in understanding the items.

### 2.5. Statistical analysis

The statistical analysis of the quantitative variables was conducted using the Statistical Package for the Social Sciences software for

Windows (IBM SPSS, v. 27.0, Armonk, NY, United States) and JASP v.0.18.3. The Lavaan package was used to analyse the structure of the scale and to test the models.

The study included a characterization of the participants and the scale. The sample distribution was determined using the Kolmogorov-Smirnov test (K-S) for nominal variables. Mardia's test was used to check multivariate normality and to choose the most appropriate factor analysis method. The sociodemographic data were expressed using frequency and percentage. The mean and standard deviation were calculated for the age variable and medians and interquartile range (IQR) were used for the OMS-HC scores.

### 2.5.1. Psychometric properties

**2.5.1.1. Validity.** The following assumptions were considered to assess the feasibility of conducting an Exploratory Factorial Analysis (EFA): ratio  $\geq 10$  observations/variable, correlation coefficients greater than .30, a Kaiser-Meyer-Olkin (KMO) test result of over .60 and a statistically significant result ( $p < .05$ ) in Bartlett's test.

Principal Axis Factoring, an extraction method with an oblique rotation (Promax) was used to identify the factors underlying the theoretical model, as a relationship between the dimensions is assumed. Polychoric correlations were used because the data did not follow the normal distribution, due to the ordinal nature of the responses (Gadermann et al., 2012). The extraction of three factors corresponding to the theoretical dimensions of attitudes, disclosure and social distance proposed in the original model (Modgill et al., 2014) was forced. Factor extraction was confirmed using Horn's parallel analysis (Horn, 1965). This method compares the progressive eigenvalues from the given data matrix to those from a simulated data matrix, using random data of the same size and the inflection points on the Scree plot (Cattell, 1966).

The factor structure was determined by a Confirmatory Factor Analysis (CFA). A CFA was performed using the Diagonally Weighted Least Squares (DWLS) estimation method for ordinal data (Li, 2016) with robust standard errors. The absolute and incremental fit indices were calculated to evaluate the model fit and the generally recommended criteria were adopted.

The absolute fit indices used were the normed chi-squared model ( $\chi^2/df$ ), the Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI). Values  $\leq 3$  for ( $\chi^2/df$ ) and .95 for CFI and TLI indicate a good fit (Hu and Bentler, 1999). The Goodness-of-Fit Index (GFI) values were  $> .90$ . The Expected Cross-Validation Index (ECVI) represents the correlation between the variables in the model, closer to 1 correlation is better (Escobedo Portillo et al., 2016).

The incremental fit indices used were the Root-Mean-Square Error of Approximation (RMSEA). Values under .05 suggest a good model fit if the 90 % confidence interval is between 0 and .50. The Normed Fit Index (NFI) compares the proposed model and the null model and a value is considered acceptable if it is greater than .90. The Parsimony Normalised Fit Index (PNFI) relate the constructs to the underlying theory and the closer to 1 the better their relationship (Escobedo Portillo et al., 2016).

Spearman's rank correlation coefficients were calculated between the OMS-HC scale and the Level of Contact Report to evaluate convergent validity. The hypothesis tested was that higher scores on the Level of Contact questionnaire would be associated with lower scores on the OMS-HC questionnaire. A significant negative correlation would suggest that both questionnaires assess the same construct, thereby supporting their validity (Hinkle et al., 2002).

### 2.5.2. Reliability

Internal consistency was calculated through a polychoric correlation between the items (ordinal alpha) because the instrument uses an ordinal response scale (Gadermann et al., 2012).

## 3. Results

### 3.1. Sample characteristics

The final sample comprised 747 nursing students, excluding incomplete questionnaires (those with more than 5 % of the items unanswered) and the age outliers, representing 11.25 % ( $n = 95$ ). Most participants were women ( $n = 618$ , 82.1 %) and the mean age was 22.5 years ( $\pm 5.57$ ). The age range between 20 and 22 years was the most representative ( $n = 461$ , 61.4 %); 21.6 % ( $n = 163$ ) of the sample had a relative with a mental disorder; the most common were major depression ( $n = 221$ , 29.3 %) and eating disorders ( $n = 179$ , 23.8 %). The sociodemographic characteristics, the level of contact report and the OMS-HC scores are presented in Table 1.

### 3.2. Scale structure

The results of the Mardia Multivariate Normality test indicated a multivariate skewness of  $\beta_{1,15} = 41.64$  and a multivariate kurtosis of  $\beta_{2,15} = 319.91$  and  $p < .001$ , suggesting that the assumption of multivariate normality is violated by both.

The KMO was  $= .825$ , with  $p < .001$  and Bartlett's test of sphericity was  $B = 2135.60$ , with ( $df = 105$ ),  $p < .001$ , ratio  $n^\circ$  observations  $\div$  variable  $= 49.9$ . A total of three factors were confirmed considering Horn's Parallel Analysis (Horn, 1965) and the scree plot (see Fig. 1). The eigenvalues of the first three factors are greater than the corresponding simulated mean eigenvalues (Table 2).

The three extracted factors accounted for 31.5 % of the total variance. The distribution of items across the factors did not align with the theoretical model (Table 3). Items 4, 5 and 10 had factor loadings lower than .30 and following the established criteria the items were eliminated to assess the fit of models by CFA.

Those items were: OMS 4: "I would see myself as weak if I had a mental illness and could not fix it myself", OMS 5: "I would be reluctant to seek help if I had a mental illness" and OMS 10: "There is little I can do to help people with mental illness".

Three models were tested in the confirmatory factor analysis (CFA).

**Table 1**  
Sociodemographic characteristics of the sample ( $n = 747$ ).

	N	%
Age mean $\pm$ SD (in years)	22.5 $\pm$ 5.57	
<b>Gender</b>		
Male	128	17.0
Female	618	82.1
No identified	1	
<b>OMS-HC total Score (median <math>\pm</math> IQR)</b>	28 $\pm$ 8	
<b>Level of contact report</b>		
Never observed person with mental illness	35	4.6
Observed, in passing, person with mental illness	68	9.0
Watched movie about mental illness	18	2.4
Watched television documentary about mental illness	38	9.5
Observed person with mental illness frequently	87	11.6
Worked with a person with mental illness	17	2.3
Job includes services for persons with mental illness	139	18.6
Provides services to persons with mental illness	20	2.7
Family friend has mental illness	93	12.4
Relative has mental illness	163	21.6
Lives with a person who has mental illness	48	6.4
Has a serious mental illness	23	3.1
<b>Most common diagnoses among friends and relatives</b>		
Autism/Asperger	118	15.7
Bipolar disorder	89	11.8
Major Depression	221	29.3
Eating disorder	179	23.8
Personality limit disorder	36	4.8
Schizophrenia	115	15.3
Schizoaffective disorder	15	2.0

IQR: Interquartile range, SD: Standard Deviation

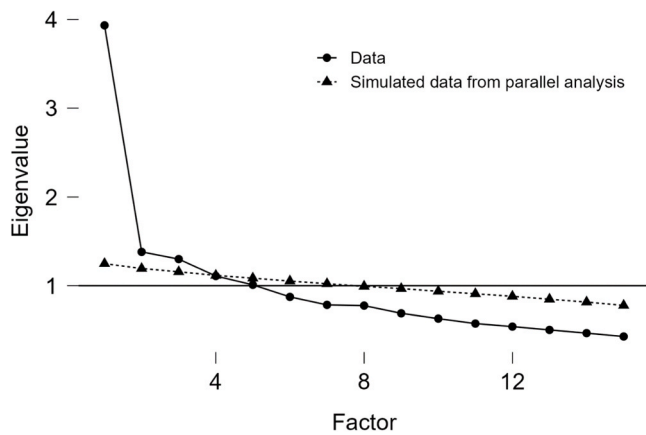


Fig. 1. Scree plot.

Table 2  
Parallel analysis.

	Real data component eigenvalues	Simulated data mean eigenvalues
Factor 1*	3.933	1.249
Factor 2*	1.381	1.194
Factor 3*	1.300	1.156
Factor 4	1.108	1.116
Factor 5	1.009	1.084
Factor 6	.874	1.052
Factor 7	.784	1.022
Factor 8	.776	.993
Factor 9	.690	.967
Factor 10	.630	.937
Factor 11	.575	.909
Factor 12	.540	.880
Factor 13	.503	.848
Factor 14	.467	.815
Factor 15	.429	.778

\*\* = Factor should be retained. Results from PC-based parallel analysis.

Table 3  
Factor Loadings.

	Factor 1	Factor 2	Factor 3	Uniqueness
OMS 2	.796			.505
OMS 7	.696			.640
OMS 6	.624			.703
OMS 12	.534			.517
OMS 9	.468			.670
OMS 1	.426			.787
OMS 11	.322			.754
OMS 15		.680		.610
OMS 13		.635		.709
OMS 14		.404		.613
OMS 3			.830	.427
OMS 8			.554	.643
OMS 10				.890
OMS 4				.865
OMS 5				.933
Variance	16.4	8.1	7.0	

Applied rotation method is promax.

These were two three-dimensional models - the original structure proposed by Modgill et al. (2014) and the OMS-HC-12 items - and one unidimensional model, the OMS-HC-15 items.

The OMS-HC-12 items structure proposed by EFA explained 37.7 % of the variance of the items. Factor one explained 19.8 %, factor two 9.3 % and factor three 6.7 % of the variance, respectively. Table 4 shows the results of CFA for this model. The items of the first factor did not have significant loadings. Additionally, the loadings of items 13 and 15

on the second factor were below .30. The structure does not have a good fit for the model's validity. This could be due to the poor factor loadings provided by the items.

The original model proposed by Modgill et al. (2014) was tested, with items 1, 9, 10, 11, 13 and 15 in the first factor, items 3, 4, 5 and 8 in the second factor and items 2, 6, 7, 12 and 14 in the last factor. The factor analysis results show that all the indicators have significant relationships with their respective factors ( $p < .05$ ). For Factor 1, items 13 and 15 have a weak relationship. For Item 13: Standard Estimation = .121,  $p = .012$ ; for Item 15: Standard Estimation = .271,  $p < .001$ ; for Factor 2: item 5: Standard Estimation = .152,  $p = .004$  and for Factor 3, item 6: Standard Estimation = .383,  $p < .001$ . This model obtained a good fit for both the absolute fit indices and the incremental fit indices, as can be seen in Table 5.

In the OMS-HC-15-item unifactorial version, the factorial loadings of the items are significant (Table 6) and the validity is quite adequate, as can be seen in Table 5. Fig. 2 shows the structural path for the OMS-HC 15 items, their factor loadings and standard errors.

### 3.3. Convergent validity

A low negative correlation (Spearman's Rho =  $-.125$ ,  $p < .001$ ) was found between the level of contact report and the OMS-HC-15 items' one-dimensional version scores. The results indicate a weak but significant negative correlation. The effect size transformed by Fisher's exact test was  $z = -1.26$ ;  $SE = .037$ .

### 3.4. Internal consistency

The reliability of the scale scores in the sample for each model tested is shown in Table 7. The multifactor models tested have very low reliability in some of their dimensions, although the overall reliability of the model is acceptable. The ordinal alpha for the one-dimensional version of the OMS-HC-15 items is acceptable.

## 4. Discussion

This study aimed to examine the psychometric properties of the Spanish version of the OMS-HC in a sample of nursing students at different universities in three regions in Spain. This validation study provides evidence of its conceptual equivalence with the original instrument (Wild et al., 2005). Its acceptable reliability, as reflected by the ordinal alpha for the one-dimensional version of the OMS-HC, together with its brevity and ease of administration, confirms its usefulness as an instrument for measuring nursing students' stigmatizing attitudes.

The psychometric properties of the OMS-HC have previously been measured in Spain (Óri et al., 2023), but the study did not involve students and the authors did not specify if they applied one of the Spanish versions validated in Chile (Gajardo et al., 2021) or Mexico (Valdivia Ramos et al., 2023) or if they had developed a new one. This version maintained 15 items and showed a good fit for the bifactor structure but a poor fit for the three-dimensional version.

The OMS-HC has previously been validated among students in Italy (Destrebecq, 2018) and Singapore (Chang, 2017). Their samples were more heterogeneous, including 596 nursing, physical therapy, dietetics and occupational therapy students in the Italian study and 1002 nursing and medical students (half of each) in the study carried out in Singapore. The items included and the factor structure had to be modified in both cases. The Italian study started with the original 20-item version, but reduced it to 12 items to maintain the original bifactor structure, although the authors did not provide data on the CFA they developed. The Singaporean study used the 15-item version and obtained a 14-item version with a three-dimensional structure, which differed from Modgill et al.'s original proposal in 2014. More recently, Moreira et al. (2024) in Portugal and Carrara et al. (2023) in Brazil have also had problems with the fit in the theoretical model, reducing the items' number to 12 and

**Table 4**  
Factors loading for OMS-HC 12 items three factors version.

Factor	Indicator	Estimate	SE	z-value	p	95 % Confidence Interval	Std. Est.
Factor 1	OMS 1	.183	.112	1.631	.103	[−.037.403]	.430
	OMS 9	.171	.105	1.635	.102	[−.034.376]	.505
	OMS 11	.118	.073	1.627	.104	[−.024.261]	.371
	OMS 2	.132	.081	1.623	.105	[−.027.291]	.522
	OMS 12	.223	.136	1.641	.101	[−.043.490]	.645
	OMS 6	.131	.080	1.642	.101	[−.025.288]	.384
Factor 2	OMS 7	.162	.101	1.612	.107	[−.035.360]	.443
	OMS 13	.093	.047	1.990	.047	[.001.184]	.143
	OMS 15	.164	.064	2.555	.011	[.038.289]	.329
Factor 3	OMS 14	.304	.122	2.494	.013	[.065.543]	.513
	OMS 3	.475	.061	7.834	< .001	[.356.594]	.529
	OMS 8	.612	.084	7.256	< .001	[.447.777]	.725

SE= Standard Error; Std Est (all): Standardised Estimates of all parameters

**Table 5**  
Fit indices for the confirmatory factor models.

Model	Absolut fit índices					Absolut fit índices						
	$\chi^2$	df	$\chi^2/df$	p	CFI	TLI	ECVI	GFI	PNFI	NFI	RMSEA [CI*90 %]	
Three-factorial	ORIGINAL	133.788	87	1.53	< .001	.967	.960	.267	.978	.755	.911	.027 [.017.035]
	OMS-HC 12 item (4,5,10)	69.214	51	1.35	.046	.984	.979	.165	.984	.728	.942	.022 [.003.034]
One-factorial	OMS-HC 15 Items	172.866	90	1.90	< .001	.941	.931	.311	.972	.758	.885	.035 [.027.043]

$\chi^2$ : chi-square; df: degrees of freedom; CFI Comparative fit index; TLI: Tucker–Lewis Index; RMSEA: Root-mean square error of approximation; CI: Confidence interval; Goodness-of-Fit Index (GFI), The Expected Cross-Validation Index (ECVI); Normalised Fit Index (NFI); Parsimony Normalised Fit Index (PNFI)

**Table 6**  
Factors loading for OMS-HC 15 items one factor version.

Indicator	Estimate	SE	z-value	p	95 % Confidence Interval	Std. Est.
OMS 1	.47	.043	11.00	< .001	[.387 .555]	.438
OMS 9	.43	.037	11.56	< .001	[.358 .504]	.503
OMS 10	.25	.041	6.13	< .001	[.172 .334]	.277
OMS 11	.30	.036	8.31	< .001	[.230 .373]	.374
OMS 13	.13	.049	2.55	.010	[.029 .223]	.116
OMS 15	.21	.048	4.48	< .001	[.120 .306]	.256
OMS 3	.29	.044	6.55	< .001	[.202 .375]	.288
OMS 4	.42	.052	7.98	< .001	[.316 .521]	.346
OMS 5	.13	.054	2.30	.020	[.018 .231]	.100
OMS 8	.34	.043	7.85	< .001	[.252 .420]	.355
OMS 2	.32	.029	10.96	< .001	[.261 .375]	.497
OMS 6	.31	.036	8.80	< .001	[.243 .382]	.363
OMS 7	.40	.042	9.49	< .001	[.314 .478]	.427
OMS 12	.55	.038	14.44	< .001	[.472 .621]	.624
OMS 14	.39	.049	7.97	< .001	[.295 .488]	.393

SE= Standard Error; Std Est (all): Standardised Estimates of all parameters

obtaining a three-dimensional structure with a different composition than the original model and a scale with four dimensions and 16 items respectively. In our study, all the models tested showed a good absolute and incremental fit and adequate overall reliability. However, the factor loadings of most of the items in the corresponding dimensions were not significant and the reliability of the dimensions was therefore very low. These modifications of the original scale suggest that the 15-item version with a three-dimensional structure may not be appropriate for health sciences students.

However, we found a negative and significant but weak association between the level of contact report and the OMS-HC scores. This finding is consistent with the study by Porfyri et al. (2023) of a sample of medical students in a sociocultural context similar to ours. In our study, we used the level contact report and the OMI (Opinion about Mental Illness) Scale to measure the stigma in healthcare providers. It is reasonable to assume that greater familiarity with people with a mental disorder may reduce fear and subsequently reduce social distance.

Although the magnitude of this relationship is small, these results suggest that as total familiarity increases, stigma tends to decrease. This finding suggests that the items selected by the authors are valid for measuring stigma and that the one-dimensional model is therefore acceptable for this purpose. Following the principle of parsimony, we believe that the one-dimensional model should be used in our context, respecting all the items that Modgill et al. (2014) considered appropriate after consulting a panel of experts.

The median OMS-HC score obtained by the participants in the present study (28) represented less stigmatizing attitudes than that described by Chang et al. (2017), who reported a mean score of 35.7 in their sample using a 14-item version of the scale. They included both nursing and medical students, half of whom had not previously attended clinical placements.

The OMS-HC offers a single score for nursing students in this Spanish version and this can be considered an advantage over other available instruments, such as the AQ-27, although it is robustly developed in the attributional model developed by Corrigan et al. (2003). Moreover, when applying the AQ-27, the most widely used vignette is oriented toward a psychotic disorder and this might not represent the stereotypes related to other mental health diagnoses such as depression or eating disorders.

Despite the OMS-HC development procedures being rigorous and including all the potential parts that could help generate an appropriate list of items, the fact that the original scale structure was three-dimensional but the dimensions were not based on a robust and unique theory may influence the various factor structures in the subsequent versions validated in different contexts.

#### 4.1. Strengths and limitations

This study has some strengths and limitations. Its first strength was the participation of nursing students who were bilingual in English and Spanish in the translation, the back translation and the cultural check. This allowed us to generate the items in a language that was both linguistically and culturally appropriate for the nursing students who were the final recipients of the questionnaire. The second strength was

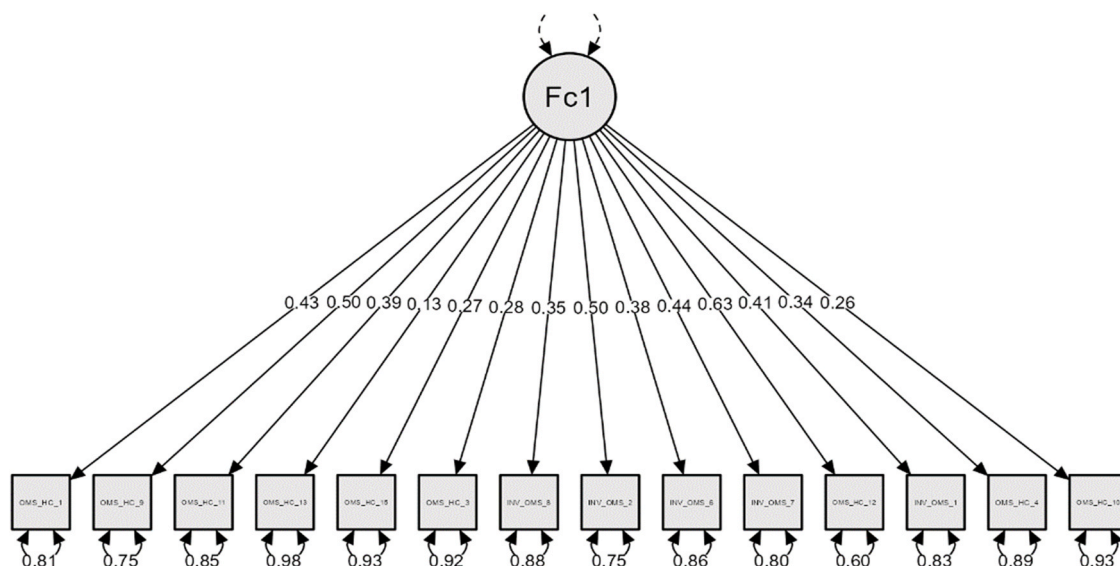


Fig. 2. Path diagram for the 15-item OMS-HC scale version. N = 747.

Table 7  
Reliability tested models.

	OMS-HC-12 item 3 Factors	OMS-HC Original 3 Factors	OMS-HC-15 items 1 Factor
	<b>α Ordinal</b>	<b>α Ordinal</b>	<b>α Ordinal</b>
Factor 1	.763	.552*	
Factor 2	.395*	.281*	
Factor 3	.194*	.718	
Total	.783	.767	.782

\* Unacceptable reliability values

the enrolment of students from three different regions in Spain, including both public and private universities. The fact that students belonged to different year groups meant that only some had previously studied mental health nursing. Another strength of this OMS-HC validation study is that it included a larger sample of nursing students than those previously available. The third strength of the study are its robust psychometric analyses.

The main limitation of this study is the sampling method, as we used convenience sampling. Another limitation is the homogeneity of the sample in terms of age, gender and discipline, which could reduce the reliability of the scale (DeVellis, 2006). It should also be considered that the fact that all the instruments used are self-reported, the social desirability, especially relevant when referring to stigma, might influence the participants' responses.

#### 4.2. Relevance for clinical practice and research

The validation of the OMS-HC in the Spanish context in nursing students with acceptable psychometric properties is a new alternative to measure stigmatizing attitudes in this population. Its relevance lies in the instructors' ability to measure changes in stigma following educational or awareness-raising interventions to ensure that people with mental disorders receive better healthcare.

### 5. Conclusion

The OMS-HC has adequate psychometric properties in Spanish nursing students. This questionnaire may be useful for nursing students to measure a specific aspect, namely stigma. However, according to the

data obtained, it is not possible to measure the three dimensions proposed by the authors in the original version, i.e. Attitudes, Disclosure and Social Distance.

#### CRediT authorship contribution statement

**Juan Diego Ramos-Pichardo:** Writing – review & editing, Visualization, Supervision, Software, Methodology, Formal analysis, Data curation, Conceptualization. **Rocío Juliá-Sanchis:** Writing – review & editing, Visualization, Methodology, Formal analysis, Data curation. **Maria C Fuentes:** Writing – review & editing, Software, Methodology, Formal analysis. **Vanessa Sánchez-Martínez:** Writing – review & editing, Writing – original draft, Visualization, Validation, Methodology, Formal analysis, Data curation, Conceptualization. **Concepción Martínez-Martínez:** Writing – review & editing, Writing – original draft, Supervision, Software, Resources, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

#### Patient or public contribution

Nursing students from several Spanish universities participated voluntarily in this study.

#### Reporting method

The STROBE checklist was used to report all aspects of this study comprehensively and accurately.

#### Ethics approval statement

This study was approved by the Ethics Committee of Research in Humans of the University of Valencia, code H155134600554.

#### Funding

This study received no funding.

#### Declaration of Competing Interest

The authors, Concepción Martínez-Martínez, Vanessa Sánchez-Martínez, Maria C Fuentes, Rocío Juliá-Sanchis & Juan Diego Ramos-Pichardo report they have no conflict of interest to declare.

## Acknowledgment

Conception or design of the work (CMM, VSM); the acquisition (CMM, JDRP, RJS, VSM), analysis (CMM, MCF, VSM), interpretation of data for the work (CMM, JDRP, MCF, RJS, VSM).

Drafting the work or reviewing it critically for important intellectual content (CMM, JDRP, MCF, RJS, VSM).

Final approval of the version to be published (CMM, JDRP, MCF, RJS, VSM).

Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved (CMM, JDRP, MCF, RJS, VSM).

## References

- Carrara, B.S., Sanches, M., Bobbili, S.J., De Godoy Costa, S., De Sousa, Á.F.L., De Souza, J., Ventura, C.A.A., 2023. Validation of the opening minds scale for health care providers (OMS-HC): factor structure and psychometric properties of the Brazilian Version. *Healthcare* 11 (7), 1049. <https://doi.org/10.3390/healthcare11071049>.
- Cattell, R.B., 1966. The scree test for the number of factors. *Multivar. Behav. Res.* [https://doi.org/10.1207/s15327906mbr0102\\_10](https://doi.org/10.1207/s15327906mbr0102_10).
- Chang, S., Ong, H.L., Seow, E., Chua, B.Y., Abdin, E., Samari, E., Teh, W.L., Chong, S.A., Subramaniam, M., 2017. Stigma towards mental illness among medical and nursing students in Singapore: a cross-sectional study. *BMJ Open* 7 (12), 1–11. <https://doi.org/10.1136/bmjopen-2017-018099>.
- Commission International Test. (2017). ITC Guidelines for Translating and Adapting Test (second ed). <https://doi.org/10.1111/j.1464-0597.1975.tb00322.x>.
- Corrigan, P., 2004. How stigma interferes with mental health care. *Am. Psychol.* 59 (7), 614–625. <https://doi.org/10.1037/0003-066X.59.7.614>.
- Corrigan, P.W., Green, A., Lundin, R., Kubiak, M.A., Penn, D.L., 2001. Familiarity with and social distance from people who have serious mental illness. *Psychiatr. Serv.* 52 (7), 953–958. <https://doi.org/10.1176/appi.ps.52.7.953>.
- Corrigan, P., Markowitz, F.E., Watson, A., Rowan, D., Kubiak, M.A., 2003. An attribution model of public discrimination towards persons with mental illness. *J. Health Soc. Behav.* 44 (2), 162–179. <https://doi.org/10.2307/1519806>.
- Destrebecq, A., Ferrara, P., Pittella, F., Rossano, G., Striano, G., Trezoni, S., Gambini, O., 2018. The Italian version of the opening Minds Stigma Scale for Healthcare Providers: validation and Study on a Sample of Bachelor Students. *Community Ment. Health J.* 54, 66–72.
- DeVellis, R.F., 2006. Classical test theory. *Med. Care* 44 (11), S50. <https://doi.org/10.1097/01.mlr.0000245426.10853.30>.
- Escobedo Portillo, M.T., Hernández Gómez, J.A., Estebané Ortega, V., Martínez Moreno, G., 2016. Modelos de ecuaciones estructurales: características, fases, construcción, aplicación y resultados. *Cienc. Trab.* 18 (55), 16–22. <https://doi.org/10.4067/S0718-24492016000100004>.
- Fox, A.B., Earnshaw, V.A., Taverna, E.C., Vogt, D., 2018. Conceptualizing and measuring mental illness stigma: the mental illness stigma framework and critical review of measures. *Stigma Health* 3 (4), 348–376. <https://doi.org/10.1037/sah0000104> (Conceptualizing).
- Gadermann, A.M., Guhn, M., Zumbo, B.D., 2012. Estimating ordinal reliability for Likert-type and ordinal item response data: a conceptual, empirical and practical guide. *Pract. Assess. Res. Eval.* 17 (3), 1–13.
- Gajardo, J., T, F., Muñoz Espinosa, I., Goycolea, R., Valdebenito, A., S, M., C, C., 2021. Traducción y análisis de validez de contenido del instrumento Opening Minds Scale for Healthcare Practitioners (OMS-HC) para la evaluación del estigma hacia la enfermedad mental en profesionales de la salud en Chile. *Rev. Chil. De NeuroPsiquiatría* 59, 91–101. (<https://doi.org/10.4067/s0717-92272021000200091>).
- Hinkle, D.E., Wiersma, W., Jurs, S.G., 2002. *Applied Statistics for the Behavioral Sciences*. CENGAGE Learning. (<https://books.google.es/books?id=74kDAAAACAA>).
- Holmes, E.P., Corrigan, P.W., Williams, P., Canar, J., Kubiak, M., 1999. Changing public attitudes about schizophrenia. *Schizophr. Bull.* 25, 447–456.
- Horn, J.L., 1965. A Rationale and test for the number of factors in factor analysis. *Psychometrika* 30 (2), 179–185. <https://doi.org/10.1007/BF02289447>.
- Hu, L.-T., Bentler, P.M., 1999. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Struct. Equ. Model. A Multidiscip. J.* 6 (1), 1–55. <https://doi.org/10.1080/10705519909540118>.
- Jayatilleke, N., Hayes, R.D., Dutta, R., Shetty, H., Hotopf, M., Chang, C.K., Stewart, R., 2017. Contributions of specific causes of death to lost life expectancy in severe mental illness. *Eur. Psychiatry* 43, 109–115. <https://doi.org/10.1016/j.eurpsy.2017.02.487>.
- Li, C.H., 2016. Confirmatory factor analysis with ordinal data: comparing robust maximum likelihood and diagonally weighted least squares. *Behav. Res. Methods* 48 (3), 936–949. <https://doi.org/10.3758/s13428-015-0619-7>.
- Link, B.G., Phelan, J.C., 2001. Conceptualizing Stigma. *Annu. Rev. Sociol.* 27, 363–385. <https://doi.org/10.1146/annurev.soc.27.1.363>.
- Ljungberg, A., Denhov, A., Topor, A., 2016. Non-helpful relationships with professionals—a literature review of the perspective of persons with severe mental illness. *J. Ment. Health* 25 (3), 267–277. <https://doi.org/10.3109/09638237.2015.1101427>.
- Martínez-Martínez, C., Sánchez-Martínez, V., Ballester-Martínez, J., Richart-Martínez, M., Ramos-Pichardo, J.D., 2021. A qualitative emancipatory inquiry into relationships between people with mental disorders and health professionals. *J. Psychiatr. Ment. Health Nurs.* 28 (4), 721–737. <https://doi.org/10.1111/jpm.12727>.
- Modgill, G., Patten, S.B., Knaak, S., Kassam, A., Szeto, A.C.H., 2014. Opening Minds Stigma Scale for Health Care Providers (OMS-HC): Examination of psychometric properties and responsiveness. *BMC Psychiatry* 14 (1), 1–10. <https://doi.org/10.1186/1471-244X-14-120>.
- Moreira, M.B.P., Pereira, H.P., Torres, I.N., Marina, S., Ricou, M., 2024. The stigma towards mental illness: Portuguese validation of the Opening Minds Stigma Scale for Healthcare Providers (OMS-HC). *Front. Psychol.* 15. <https://doi.org/10.3389/fpsyg.2024.1359483>.
- Nielsen, R.E., Banner, J., Jensen, S.E., 2021. Cardiovascular disease in patients with severe mental illness. *Nat. Rev. Cardiol.* 18 (2), 136–145. <https://doi.org/10.1038/s41569-020-00463-7>.
- Nóbrega, M., Fernandes, C., Zerbetto, S., Smapaio, F., Carvalho, J., Chaves, S., 2021. Primary health care nurses: Attitudes towards the person with mental disorder. *Rev. Gauch. De Enferm.* 42, e20200088. <https://doi.org/10.1590/1983-1447.2021.20200088>.
- Nordentoft, M., Wahlbeck, K., Hällgren, J., Westman, J., Ösby, U., Alinaghizadeh, H., Gissler, M., Laursen, T.M., 2013. Excess mortality, causes of death and life expectancy in 270,770 patients with recent onset of mental disorders in Denmark, Finland and Sweden. *PLoS One* 8 (1). <https://doi.org/10.1371/JOURNAL.PONE.0055176>.
- Ori, D., Rózsa, S., Szocsics, P., Simon, L., Purebl, G., Györfy, Z., 2020. Factor structure of the opening minds stigma scale for health care providers and psychometric properties of its Hungarian version. *BMC Psychiatry* 20 (1), 1–9. <https://doi.org/10.1186/s12888-020-02902-8>.
- Pescosolido, B.A., Martin, J.K., Lang, A., Olafsdottir, S., 2008. Rethinking theoretical approaches to stigma: A Framework Integrating Normative Influences on Stigma (FINIS). *Soc. Sci. Med.* 67 (3), 431–440. <https://doi.org/10.1016/j.socscimed.2008.03.018>.
- Porfyri, G.-N., Athanasiadou, M., Siokas, V., Angelopoulos, K., Skarpari, S., Zagalioti, S.-C., Dardiotis, E., Rudolf, J., Deretzi, G., Konsta, A., Diakogiannis, I., 2023. Mental illness through the perspective of undergraduate medical students in Greece: a cross-sectional study at Aristotle University of Thessaloniki. *Front. Psychiatry* 14, 1228539. <https://doi.org/10.3389/fpsyg.2023.1228539>.
- Sapag, J.C., Klabunde, R., Villarreal, L., Velasco, P.R., Álvarez, C., Parra, C., Bobbili, S.J., Mascayano, F., Bustamante, I., Alvarado, R., Corrigan, P., 2019. Validation of the Opening Minds Scale and patterns of stigma in Chilean primary health care. *PLoS One* 14 (9). <https://doi.org/10.1371/journal.pone.0221825>.
- Schnyder, N., Panczak, R., Groth, N., Schultze-Lutter, F., 2017. Association between mental health-related stigma and active help-seeking: Systematic review and meta-analysis. *Br. J. Psychiatry* 210 (4), 261–268. <https://doi.org/10.1192/bjp.bp.116.189464>.
- Shahif, S., Idris, D.R., Lupat, A., Abdul Rahman, H., 2019. Knowledge and attitude towards mental illness among primary healthcare nurses in Brunei: a cross-sectional study. *Asian J. Psychiatry* 45, 33–37. <https://doi.org/10.1016/J.AJP.2019.08.013>.
- Thornicroft, G., Rose, D., Kassam, A., Sartorius, N., 2007. Stigma: ignorance, prejudice or discrimination? *Br. J. Psychiatry J. Mental Sci.* 190, 192–193. <https://doi.org/10.1192/bjp.bp.106.025791>.
- Valdivia Ramos, H.N., Mora-Rios, J., Natera, G., Mondragón, L., 2023. Psychometric properties of the Mexican version of the opening minds stigma scale for health care providers (OMS-HC). *PeerJ* 11, e16375. <https://doi.org/10.7717/peerj.16375>.
- Valery, K.M., Prouteau, A., 2020. Schizophrenia stigma in mental health professionals and associated factors: a systematic review. *Psychiatry Res.* 290 (April), 113068. <https://doi.org/10.1016/j.psychres.2020.113068>.
- Wild, D., Grove, A., Martin, M., Eremenco, S., McElroy, S., Verjee-Lorenz, A., Erikson, P., ISPOR Task Force for Translation and Cultural Adaptation, 2005. Principles of good practice for the translation and cultural adaptation process for patient-reported outcomes (PRO) measures: report of the ispor task force for translation and cultural adaptation. *Value Health. J. Int. Soc. Pharm. Outcomes Res.* 8 (2), 94–104. <https://doi.org/10.1111/j.1524-4733.2005.04054.x>.
- World Medical Association. (2013). WMA - The World Medical Association-WMA Declaration of Helsinki – Ethical Principles for Medical Research Involving Human Subjects. (<https://www.wma.net/policies-post/wma-declaration-of-helsinki-ethical-principles-for-medical-research-involving-human-subjects/>).
- Zuaboni, G., Elmer, T., Rabenschlag, F., Heumann, K., Jaeger, S., Kozel, B., Mahlke, C.I., Theodoridou, A., Jaeger, M., Rüsche, N., 2021. Psychometric evaluation of the German version of the Opening Minds Stigma Scale for Health Care Providers (OMS-HC). *BMC Psychol.* 9 (1), 86. <https://doi.org/10.1186/s40359-021-00592-9>.