

# Psychometric properties of the Spanish version of the Mental Health Literacy questionnaire (MHLq-E)

Clara González-Sanguino<sup>1</sup> · Jairo Rodríguez-Medina<sup>2</sup> · Alba Ayuso-Lanchares<sup>2</sup> · y Lorena Valdivieso-León<sup>1,3</sup>

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#### Abstract

The mental health of adolescents is a topic of increasing importance in our society. Knowing the mental health literacy of this population may provide key information to improve prevention and intervention policies. This research analyses the psychometric properties of the MHLq-E Spanish version, a self-administered self-report questionnaire on mental health literacy, specific to the adolescent population. A descriptive cross-sectional study including a representative sample of Spanish adolescents aged 12–16 years (N=1000) was conducted. Results reveal a four-factor structure: help-seeking; stigma; knowledge of causes; knowledge of symptomatology. The selected four-factor solution accounts for 35% of the shared variance. High internal consistency, item reliability and good measures of validity were found. The global reliability of the questionnaire was  $\alpha$ =0.92 and  $\omega_t$ =0.94. The reliability of the dimensions ranged from  $\alpha$ =0.79,  $\omega_t$ =0.79 for Stigma to  $\alpha$ =0.87,  $\omega_t$ =0.87 for Help. Factor loads were significant and above 0.4 suggesting appropriate convergent validity, and evidence of discriminant validity was also adequate. Although it differs from the original instrument, the analysis is consistent with other research and highlights the multiple dimensions of mental health literacy. The MHLq-E is the first instrument available in Spanish to assess mental health literacy in adolescents in Spain.

Keywords Adolescents · Mental health · Mental health literacy · Psychometric properties · Validation

# Introduction

The increase of mental disorders among young people is a major concern, with figures indicating that more than 13% of adolescents suffer from some mental health problem,

y Lorena Valdivieso-León lorena.valdivieso@uva.es

Clara González-Sanguino clara.gonzalez.sanguino@uva.es

Jairo Rodríguez-Medina jairo.rodriguez.medina@uva.es

Alba Ayuso-Lanchares alba.ayuso@uva.es

- <sup>1</sup> Departament of Psychology, University of Valladolid, Valladolid, Spain
- <sup>2</sup> Departament of Pedagogy, University of Valladolid, Valladolid, Spain
- <sup>3</sup> Departament of Pychology, Facultad de Educación y Trabajo Social, University of Valladolid, Campus Miguel Delibes, Paseo de Belén, 1, Valladolid C.P. 47011, Spain

with an estimated one suicide every 11 min (United Nations Children's Fund, 2021). In Spain, after the Covid-19 pandemic, worries and fears among children and adolescents have increased, as well as mental and behavioural disorders in general (Terán, 2021), with attempts and suicidal ideation among adolescents being 24 times higher than in years before the pandemic (Ballesteros et al., 2022).

Given the relevance and implications of mental disorders, both socially and in terms of health, it is particularly important that young people are aware of mental health problems and have basic coping skills to deal with them. In other words, mental health literacy (MHL) is needed. MHL in its original definition is understood as "the body of knowledge and beliefs about mental disorders that assist in their recognition, management or prevention" (Jorm et al., 1997, p. 19). This author identifies different components within this construct: (a) ability to recognise specific disorders or different types of psychological distress; (b) knowledge and beliefs about risk factors and causes; (c) knowledge and beliefs about self-help interventions; (d) knowledge and beliefs about available professional help; (e) attitudes that facilitate recognising and seeking appropriate help; and (f) knowledge about how to obtain information about mental health (Jorm, 2000, 2012).

This construct is subsequently reformulated, emphasizing nowadays less on knowledge and more on those dimensions that can improve mental health outcomes (Kutcher et al., 2015), including information on how to obtain and maintain good mental health, understanding mental disorders and their treatments, decreasing the stigma against mental illness, and ultimately increasing the effectiveness of help-seeking (Kutcher et al., 2013). Therefore, mental health literacy addresses 3 interrelated concepts: knowledge (mental illness and positive mental health, symptomatology and causes), stigma (attitudes and prejudices against mental health) and help-seeking efficacy (ability and appropriate strategies to cope with problems of self or others) (Kutcher et al., 2015; Wei et al., 2015).

Several studies have shown the usefulness of MHL, with systematic reviews pointing out how interventions focusing on its different dimensions are key to prevent and promote mental health (Kågström et al., 2023; Marinucci et al., 2023), being especially useful in increasing knowledge about mental health problems (Amado-Rodríguez et al., 2022). These interventions are useful both for young people (Seedaket et al., 2020), as well as for their application in school contexts (Amado-Rodríguez et al., 2022; Kusaka et al., 2022), and for families and teachers (Kusaka et al., 2022; O'Connell et al., 2021; Yamaguchi et al., 2020). However, despite the proven effectiveness and importance of MHL, a recent bibliometric review shows that research on it is scarce, finding 225 papers from 1977 to 2020, with a downward trend in the number of publications and citations, with most of the studies coming from the Anglo-Saxon area (Australia, USA, Canada and UK) (Aswathi Raj et al., 2021).

Linked to the development of these interventions to promote MHL, reliable and valid instruments have been developed to assess MHL in adolescents. Various psychometric instruments have been developed, specifically, Kucera et al. (2023), in their systematic review on the subject, identified 21 measures, ranging from those that assess each dimension of the construct independently on professional help-seeking, attitudes and/or knowledge (Wei et al., 2015, 2016), to those that address MHL as a whole construct with different dimensions (Cresswell-Smith et al., 2023; O'Connor et al., 2014). Among the instruments developed, only 2 provided measures of MHL as a unitary construct, and 16 were developed in English. In addition, the review notes how measures are often developed in subpopulations, such as for a target group of children learning about a specific diagnosis, and do not comprehensively assess mental health literacy covering all dimensions of the construct (knowledge, stigma and help-seeking), as well as and no study was simultaneously

psychometrically sound, developed for universal or representative populations.

In Spanish we only have two instruments that assess some dimension of MHL. One is focused on knowledge, developed within the implementation of an online intervention EspaiJove.net to improve young people's knowledge towards general mental health (Castellvi et al., 2019). The other is the Spanish version of the Community Attitudes Mental Illness (CAMI-Spanish version) (Ochoa et al., 2016) and focuses on stigma.

However, in a nearby context and with a similar culture, in Portugal it is possible to cite the Mental Health Literacy Questionnaire for Young People (MHL-q young people) by Campos et al. (2016). This tool was specifically designed and evaluated in a sample of adolescents (11-17 years) and showed good psychometric properties, being recommended for use by the latest systematic review on the subject (Kucera et al., 2023). MHL-q young people consists of 33 Likert-type items organized in 3 dimensions that address all the MHL's dimensions: (1) Help-seeking and first aid skills; (2) Knowledge/stereotypes on mental health problems; (3) Self-help strategies. In addition to the independent scores for each dimension, an overall score (calculating the sum of the responses for all items) is obtained. MHL-q young people, according to a systematic review about the MHL measures in Portugal (Barros et al., 2023), is the only psychometric tool for adolescents that assesses MHL as a unitary construct with all its dimensions in this country. The questionnaire has been used in studies to assess MHL in adolescents, especially to assess the effectiveness of intervention programmes (Campos et al., 2018; Zare et al., 2021) and has been translated into other languages, such as Persian (Zare et al., 2022). Additionally, it has a version for young adults the MHLq-young adult (Dias et al., 2018), that has been adapted in different countries such as China (Wu et al., 2023), Indonesia (Pribadi et al., 2023), Malawi (Jumbe et al., 2023) or Turkey (Gunaydin et al., 2023). It also has a reduced version, MHLq-SVa, that has been validated internationally (Campos et al., 2022).

Taking into account the existing limitations such as the scarcity of previous instruments that consider MHL as a unitary construct with different dimensions, non-existent in Spain, and the lack of instruments developed in representative populations, the aim of this study is to study the psychometric properties of MHLq-young people in a representative sample of Spanish adolescents, developing its Spanish version and carrying out an analysis of its properties.

# **Hypotheses**

Several hypotheses are pursued in this article, detailed as follows:

- H1: It is expected that the MHLq-E in its Spanish version will present a factorial structure consistent with previous versions of the questionnaire.
- H2: It is expected that the reliability measurements for each factor of the MHLq-E will demonstrate excellent or adequate consistency.
- H3: It is expected that the convergent validity analysis will show that the factor loadings of the indicators will be significant and exceed the threshold of 0.4, thereby supporting the convergent validity of the constructs.

Table 1 Sociodemographic characteristics of the simple	
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Variable	N	%
Gender		
Male	493	49.3
Female	500	50
None of the above	7	0.7
Age		
12	199	19.9
13	199	19.9
14	203	20.3
15	200	20
16	199	19.9
Size of municipality		
0-1.000	231	23.1
1.001-5.000	255	25.5
5.001-20.000	226	22.6
More of 20.000	288	28.8
Monthly household income		
Until 2160	419	41.9
Between 2160-4000	474	47.4
More than 4000	107	10.7
Top studies in the family		
No schooling	3	0.3
Primary	39	3.9
Obligatory secondary education/Vocational training	382	38.2
University	445	44.5
Máster's degree/Phd	131	13.1
Educational Centre		
Public	695	69.5
Subsidised	256	25.6
Private	49	4.9
Contact with mental health		
Don't know anyone	623	62.3
Friend with MHP	226	22.6
Family member with MHP	134	13.4
Family member or friend	328	32.8
MHP in self	49	4.9

# Method

## **Procedure and participants**

This study is part of the project "Stigma and discrimination as a factor of vulnerability in childhood" funded by the Caixa's Flash Call Childhood Vulnerability (FS23-IB). Sampling and data collection took place in October and November 2023. The recruitment of participants was carried out through the "Análisis e investigación" ISO 20.252-certified survey company. Adults with children aged 12–16 were recruited using a panel methodology by sending an individual invitation link to participate in the survey. A small reward in the form of points exchangeable for other rewards was received for participation. Inclusion criteria for adolescents were (a) aged 12-16 years; (b) access to the internet and mobile device or computer. Exclusion criteria were (a) not having an adequate level of Spanish to answer the items of the instrument. The duration of the evaluation protocol was 20 min and all the items were mandatory and were in the same order in all applications.

The sampling was stratified random in a panel sample according to sex, age and territorial distribution in Spain (sampling error 3.1% with a confidence level of 95.5% for an infinite universe and under the assumption of maximum indeterminacy). A total of N=1000 adolescents participated in the study. Participants had a mean age of 14 years (Standard Deviation=1.41) with a balanced number of adolescents in each age group (e.g., 12 years N=200; 13 years N=200 etc.). 50% of the adolescents were female, and only a 0.7% did not identified with male or female. Most of the adolescents attend public schools (69.5%). Regarding households, most of the families resided in large municipalities (53%), with university education (44.5%), and a monthly income between 2160 and 4000 euros (47.4%). In relation to contact with mental health, most of the adolescents reported not knowing anyone with mental health problems (62.3%). Table 1 shows in detail the characteristics of the sample.

Data collection was done through an online survey using CAWI (Computer Assistance Web Interview) methodology, and a cross-sectional natural group design (NGD) (Shaughnessy et al., 2012) was used to assess the consistency of responses. The survey could be completed in multi-device technology (PC, tablet, smartphone...).

The evaluation process was divided in two parts. First, information about the study and informed consent were provided to families interested in participating in the survey. Then they answered some socio-demographic questions (5 min), instructing them to leave their child alone to answer the rest of the survey. Afterwards adolescents answered different questions, between them the MHLq-E (25 min). All

the data collected were anonymous and were approved by the ethics committee of the University of Valladolid. (registration number PI23-3245NOHCUV).

#### Variables and instruments

#### **Sociodemographics**

Evaluated by means of ad hoc questions answered by both parents and adolescents.

Questions answered by the parents: age of the son or daughter; place of residence; monthly income (calculated on the basis of the minimum wage for two persons: up to 2160; between 2160 and 4000; over 4000); highest educational level of the family unit (no studies; primary school; ESO/FP; university students; master's/doctorate); and type of school the child attends (public; subsidized; private).

Questions answered by the children: gender (male, female, not identified with male or female); previous contact with mental health (not knowing anyone with mental health problems; nowing a family member; knowing a friend; having or having had a first-person mental health problem.).

#### Mental health literacy

The Mental Health Literacy questionnaire– young people (MHLq-young people) (Campos et al., 2016) was utilized, consisting of 33 items in which participants are asked to express their level of agreement with each statement on a five-point Likert scale (1=strongly disagree; 2=disagree; 3=neither agree nor disagree; 4=agree; 5=strongly agree). The items refer to young people's knowledge about the stigma associated with mental health issues.

The questionnaire is structured in 3 dimensions: (1) helpseeking and first aid skills; (2) knowledge/stereotypes on mental health problems; (3) self-help strategies. The first of the dimension consists of 10 items related to seeking help and first aid skills. Two representative items are: "If a friend of mine developed a mental disorder, I would offer them my support" or "If I myself had a mental health problem, I would seek help from my family." The second dimension, concerning stereotypes and knowledge about mental health problems, comprises 18 items. Two representative items are: "A person with depression feels very unhappy" and "People with schizophrenia usually have delusions (e.g., they may believe that they are constantly being watched or pursued)." The third dimension refers to self-help strategies. It includes items such as: "Physical exercise helps improve mental health" and "Sleeping well helps improve mental health." The questionnaire allows obtaining an overall score of MHL by summing up the three dimensions, as well as scores for each of them. A higher score indicates higher MHL.

This instrument has demonstrated sufficient evidence regarding both reliability and score interpretation validity (Campos et al., 2016), has been employed in evaluating the construct in intervention program applications (Dias et al., 2018), and has an adult version (Dias et al., 2018) translated into multiple languages (Campos et al., 2022; Günaydin et al., 2023; Jumbe et al., 2023; Pribadi et al., 2023; Wu et al., 2023). The Cronbach's Alpha values in the original version were: help-seeking and first aid skills  $\alpha$ =0.78, knowledge/stereotypes  $\alpha$ =0.71, and self-help strategies  $\alpha$ =0.71.

For the Spanish version, it was translated from English into Spanish by a bilingual person, and then translated back into English by another person to ensure consistency in the translation. Both persons where part of the research team of the project which founded the research. The original questionnaire also includes information on sociodemographic characteristics such as age, gender, province, or population of the municipality where the participant resides. However, these questions were omitted in this version as they were included in the sociodemographic variables section. Good comprehension of the items was ensured by conducting a small focus group with 10 adolescents where they completed the questionnaire and were asked if they had problems in understanding any item. Since no difficulties were detected, no changes were made. A printable ready-to-use version of MHLq-E can be found in the supplementary material (supplementary material 2) together with interpretation instructions and a scale of the questionnaire in the Spanish population.

#### **Data analysis**

First, a descriptive analysis of the dataset was conducted. Subsequently, the original sample was split into two random subsamples of 500 participants each, and an Exploratory Factor Analysis (EFA) was performed on the polychoric correlation matrix between the items (Bollen, 1989) calculated from the responses of the first half (n=500). After confirming the data's suitability for factor analysis using Kaiser Meyer Olkin (KMO) and Barlett's sphericity tests, an optimized parallel analysis (Timmerman & Lorenzo-Seva, 2011) was conducted. Exploratory Graph Analysis (EGA) (Golino & Epskamp, 2017) was also employed to determine the optimal number of factors and structure summarizing the dataset.

Finally, using the polychoric correlation matrix obtained from the second random subsample (n=500), Confirmatory Factor Analysis (CFA) estimated three models: the first one with three correlated factors following the model of the original MHLq-young people, the second one with four correlated factors following the results of the EFA and EGA, and the third one with four correlated factors but removing one item taking into account the results of the descriptive analysis. Reliability of the measures (internal consistency, reliability of individual indicators, construct reliability, and measurement error) was estimated on the model with better results. Moreover, evidence regarding the convergent and discriminant validity of the proposed model was obtained. All models were estimated using Diagonally Weighted Least Squares on the polychoric correlation matrix using R software version 4.3.1 (R Core Team, 2023) and the lavaan package (Rosseel, 2012). Model fit was evaluated using the following parameters: chi-square, degrees of freedom, p-value, Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA) with 90% confidence intervals, and Standardized Root Mean Square Residual (SRMR). Sufficient evidence of fit and therefore adequate model fit was considered if CFI>0.95, TLI>0.95, RMSEA<0.06, and SRMR<0.08 (Browne & Cudeck, 1992; Hu & Bentler, 1999). For model comparison, recommendations from Chen (2007) and Cheung and Rensvold (2002) were followed, where changes smaller than 0.010 in CFI and TLI, and decreases smaller than 0.015 in RMSEA suggest no relevant changes in model fit from a less restrictive to a more restrictive model, to establish the significance of fit differences between models.

# Results

#### Descriptive analysis of the results

Table 2 presents the measures of central tendency and dispersion for each item. The descriptive analysis of the data reveals a consistent trend in adolescents' responses regarding mental health. On average, most items show scores between 3.7 and 4.5, with standard deviations ranging from 0.64 to 1.13. The median tends to hover around 4 in most cases, indicating a concentration of scores near this value. For instance, in item MHQ1, evaluating the willingness to seek professional help for a friend with mental health issues, a high mean of 4.47 is observed, indicating a strong inclination to offer support. This trend is reflected in the median of 5, suggesting that half of the surveyed adolescents expressed a maximum willingness to seek help for a friend in distress. In the supplementary material (Table S1), they display the response frequencies obtained in each of the questionnaire items.

However, some variability in responses is evident, as seen in the range's breadth (from 4 to 5 points) on the questionnaire used. MHQ24 "*If a friend of mine developed a mental disorder, I would not be able to help him or her*" for example, reveals a different perspective with a considerably lower mean of 2.84, implying a lower inclination to seek professional help for one's mental health problems. The response variability, indicated by the standard deviation of 1.0, signifies a wide range of attitudes among respondents, with some responses well below the average and others closer to the maximum possible value. However, this item obtained a very low factor loading in the EFA (.219) and a communality of.0059, showing its poor performance (see supplementary material Table S2). In fact, this item will be eliminated in the CFA in the final model, and therefore eliminated from the final version of the questionnaire (see supplementary material 2).

## **Exploratory factor analysis**

The optimized parallel analysis over 1000 random replications yielded an optimal one-factor solution when considering the 95th percentile of the random variance proportion and a four-factor solution when considering its mean. The selected four-factor solution accounts for 35% of the shared variance (detailed results can be observed in the supplementary material, Table S2). In order to gather evidence regarding the questionnaire's internal structure, an Exploratory Graph Analysis (EGA) (Golino & Epskamp, 2017) was conducted. Exploratory graph analysis (EGA) is a method for estimating the number of dimensions in psychological data. It is based on the graphical lasso, a statistical method for estimating the strength of relationships between variables. EGA first estimates the graphical lasso, and then uses a community detection algorithm to identify the number of dimensions in the data (Golino et al., 2022). EGA has several advantages over traditional methods for estimating the number of dimensions, such as parallel analysis and the minimum average partial variance (MAP) method (Golino & Demetriour, 2017). First, EGA is more robust to violations of the assumptions of these traditional methods. Second, EGA is more likely to identify the correct number of dimensions, even when the data are complex. Third, EGA is more computationally efficient than these traditional methods (Golino et al., 2020).

The outcome is depicted in Fig. 1. As observed, the Exploratory Graph Analysis (EGA) also identified a four-factor structure.

## **Confirmatory factor analysis**

In the second phase, the goodness of fit of three alternative models with three and four factors was compared. The outcome favored the correlated four-factor model where item 24 was removed (Table 3). As observed in Table 3, the improvement in the fit of the four-factor model over the others was conclusive.

Table 2 Measure	ss of central to	endency and di-	spersion									
Vars	и	mean	sd	median	trimmed	mad	min	max	range	skew	kurtosis	se
MHQ1	1000	4.47	0.64	5	4.55	0	1	5	4	-1.16	2.17	0.02
MHQ2	1000	4.25	0.78	4	4.36	1.48	1	5	4	-1.07	1.59	0.02
MHQ3	1000	4.22	0.77	4	4.32	1.48	1	5	4	-0.97	1.29	0.02
MHQ4	1000	3.9	0.75	4	3.9	1.48	1	5	4	-0.14	-0.51	0.02
MHQ5	1000	4.46	0.74	5	4.6	0	1	5	4	-1.53	2.81	0.02
MHQ6	1000	4.3	0.77	4	4.41	1.48	1	5	4	-1.12	1.69	0.02
MQH7r	1000	4.02	1.01	4	4.19	1.48	1	5	4	-1.18	1.09	0.03
MHQ8	1000	3.34	0.99	3	3.34	1.48	1	5	4	-0.16	-0.34	0.03
MHQ9	1000	4.25	0.74	4	4.34	1.48	1	5	4	-0.86	6.0	0.02
MHQ10	1000	4.2	0.78	4	4.28	1.48	1	5	4	-0.84	0.84	0.02
MHQ11	1000	4.22	0.71	4	4.29	1.48	1	5	4	-0.69	0.79	0.02
MHQ12r	1000	4.17	0.92	4	4.29	1.48	1	5	4	-1.04	0.79	0.03
MHQ13	1000	4.26	0.71	4	4.35	1.48	1	5	4	-0.89	1.39	0.02
MHQ14	1000	3.99	0.85	4	4.06	1.48	1	5	4	-0.68	0.36	0.03
MHQ15r	1000	3.9	1.06	4	4.04	1.48	1	5	4	-0.95	0.38	0.03
MHQ16	1000	4.47	0.64	5	4.55	0	1	5	4	-1.1	1.51	0.02
MHQ17r	1000	4.31	0.85	4	4.46	1.48	1	5	4	-1.54	2.79	0.03
MHQ18	1000	3.8	0.8	4	3.82	1.48	1	5	4	-0.39	0.26	0.03
MHQ19	1000	4.31	0.66	4	4.38	0	1	5	4	-0.81	1.27	0.02
MHQ20	1000	3.88	0.87	4	3.96	0	1	5	4	-0.76	0.65	0.03
MHQ21	1000	3.7	0.84	4	3.71	1.48	1	5	4	-0.25	-0.11	0.03
MHQ22	1000	4.11	0.75	4	4.17	0	1	5	4	-0.78	1.18	0.02
MHQ23	1000	3.83	0.83	4	3.86	1.48	1	5	4	-0.44	0.11	0.03
MHQ24r	1000	2.84	1	3	2.83	1.48	1	5	4	0.16	-0.4	0.03
MHQ25	1000	3.45	0.79	3	3.42	1.48	1	5	4	0.09	0.05	0.03
MHQ26r	1000	3.79	1.13	4	3.93	1.48	1	5	4	-0.83	-0.04	0.04
MHQ27	1000	4.49	0.66	5	4.59	0	2	5	3	-1.12	0.86	0.02
MHQ28	1000	4.19	0.68	4	4.25	0	1	5	4	-0.67	1.15	0.02
MHQ29	1000	3.32	1	ŝ	3.33	1.48	1	5	4	-0.36	-0.2	0.03
MHQ30	1000	4.2	0.68	4	4.27	0	1	5	4	-0.65	0.98	0.02
MHQ31	1000	4.01	0.8	4	4.05	1.48	1	5	4	-0.54	0.34	0.03
MHQ32	1000	4.12	0.7	4	4.18	0	1	5	4	-0.57	0.68	0.02
MHQ33	1000	4	0.74	4	4.04	0		5	4	-0.53	0.5	0.02



Factor 3: Knowledge etiology

Fig. 1 Graphical representation of exploratory graph analysis

Table 3	Comparison	of fit indices	for the three	models cons	sidered
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Model	$\chi^2$ (df)	$\Delta \chi^2 (\Delta df)$	$p(\Delta \chi^2)$	RMSEA	ΔRMSEA	CFI	ΔCFI	TLI	ΔTLI
1 Factor	2328.41 (495)			0.061		0.906		0.900	
3 Factors	1848.92 (492)	479.48 (3)	< 0.001	0.051	0.01	0.930	0.024	0.925	0.025
4 Factors EGA	1358.97 (489)	489.95 (3)	< 0.001	0.042	0.009	0.955	0.025	0.952	0.027
4 Factors (-i24)	1295.57 (458)	553.35 (34)	< 0.001	0.043	0.008	0.955	0.025	0.953	0.028

RMSEA root mean square error of approximation, CFI comparative fit index, TLI Tucker-Lewis index, df degrees of freedom, CI confidence interval;  $\Delta$  (CFI, TLI, RMSEA)=changes in fit with respect to the previous least restrictive model

## Definitive MHLq-E model

Taking into account the results, the model selected as definitive is the 4-factor model, eliminating item 24. Thus, the MHLq-E is made up of 4 dimensions with 32 items: (1) Help-seeking and skills: items 1, 5, 6, 8, 10, 13, 19, 20, 28; (2) Stigma: items 7, 12, 15, 17, 25 (all of them reversed); (3) Knowledge: Causes: items 2, 9, 14, 16, 21, 26, 29, 31; (4) Knowledge: Symptoms: items 3, 4, 11, 18, 22, 23, 24, 27, 30, 32. The final model with the grouping of items can be seen in Fig. 2, as well as in the supplementary material 2, where the questionnaire can be accessed in Spanish, prepared for its use and with the correction instructions.

## **Reliability and validity**

Reliability values of ordinal alpha (Gadermann et al., 2012) were obtained at  $\alpha$ =0.92 [0.92, 0.93], and omega  $\omega$ t=0.94 [0.92, 0.93] (McDonald, 2013; Revelle & Zinbarg, 2009). Both values are considered excellent. Concerning the first dimension (Help seeking and First aid skills), good internal



Fig. 2 Definitive model of four correlated factors

consistency indices were obtained ( $\alpha 1=0.87$  [0.86, 0.88];  $\omega t 1=0.87$  [0.86, 0.88]). Regarding the second dimension (Stigma), adequate reliability indices were obtained ( $\alpha 2=0.79$  [0.77, 0.81];  $\omega t 2=0.79$  [0.77, 0.81]). Similarly, in relation to the third dimension (Knowledge — Etiology), adequate reliability values were obtained ( $\alpha 3=0.84$  [0.83, 0.86]). Lastly, for the fourth dimension (Knowledge — Symptoms), good internal consistency indices were obtained ( $\alpha 4=0.84$  [0.83, 0.86];  $\omega t 4=0.84$  [0.83, 0.86]).

Composite reliability (CR) analysis for each latent variable provides a measure of construct reliability. In all cases, CR was higher than 0.70 (CR1=0.82; CR2=0.72; CR3=0.78; CR4=0.79), allowing us to conclude that the indicators of the four dimensions, considered together, form a reliable measure of the construct. Concerning the average variance extracted (AVE), values were obtained as  $AVE_1=0.34$  for the first latent variable;  $AVE_2=0.35$  for the second;  $AVE_3=0.34$  for the third, and  $AVE_4=0.28$  for the fourth latent variable.

Overall, all these indicators provide evidence of reliability in operationalizing the three latent variables comprising

 Table 4 Estimations of the definitive correlated four-factor solution

Item	В	SE	Z	<i>p</i> -value	Beta	$R^2$
Help Seeking				•		
MHQ1	0.382	0.011	33.872	< 0.001	0.600	0.361
MHQ5	0.434	0.013	32.397	< 0.001	0.586	0.344
MHQ6	0.500	0.014	36.658	< 0.001	0.652	0.424
MHQ8	0.459	0.015	3.513	< 0.001	0.466	0.217
MHQ10	0.504	0.013	38.032	< 0.001	0.644	0.415
MHQ13	0.457	0.012	37.518	< 0.001	0.640	0.410
MHQ19	0.515	0.012	43.521	< 0.001	0.776	0.601
MHQ20	0.388	0.014	28.225	< 0.001	0.447	0.200
MHQ28	0.346	0.014	23.915	< 0.001	0.347	0.121
Stigma						
MQH7r	0.578	0.026	22.478	< 0.001	0.573	0.328
MHQ12r	0.498	0.023	21.827	< 0.001	0.542	0.294
MHQ15r	0.582	0.026	22.677	< 0.001	0.552	0.305
MHQ17r	0.657	0.024	27.573	< 0.001	0.773	0.598
MHQ25r	0.560	0.026	21.839	< 0.001	0.497	0.247
Knowledge Caus	ses					
MHQ2	0.375	0.013	29.092	< 0.001	0.478	0.229
MHQ9	0.406	0.012	32.996	< 0.001	0.550	0.302
MHQ14	0.402	0.013	31.495	< 0.001	0.473	0.224
MHQ16	0.426	0.011	4.067	< 0.001	0.665	0.442
MHQ21	0.350	0.012	28.581	< 0.001	0.417	0.174
MHQ26	0.403	0.011	37.853	< 0.001	0.613	0.376
MHQ29	0.398	0.011	35.390	< 0.001	0.588	0.346
MHQ31	0.449	0.011	39.363	< 0.001	0.645	0.417
Knowledge Symp	otoms					
MHQ3	0.342	0.012	28.267	< 0.001	0.446	0.199
MHQ4	0.370	0.012	32.132	< 0.001	0.490	0.240
MHQ11	0.427	0.011	37.116	< 0.001	0.600	0.360
MHQ18	0.369	0.012	3.060	< 0.001	0.461	0.212
MHQ22	0.459	0.012	37.026	< 0.001	0.610	0.372
MHQ23	0.374	0.012	3.030	< 0.001	0.452	0.205
MHQ24	0.307	0.011	27.002	< 0.001	0.387	0.150
MHQ28	0.446	0.011	39.046	< 0.001	0.654	0.428
MHQ30	0.436	0.012	36.378	< 0.001	0.548	0.301
MHQ32	0.444	0.012	36.812	< 0.001	0.600	0.360

the questionnaire; however, the average variance extracted is below the desired value of 0.5. Simultaneously, the reliability of individual indicators was also analyzed. Table 4 displays the saturations, standard errors, t-values, p-values, and  $R^2$  of the standardized four correlated factors solution. In all cases, both saturations and  $R^2$  values were statistically significant at p < .001.

In terms of convergent validity evidence, as observed in Table 4: (a) factor loadings of all indicators were significant; and (b) all except two were above 0.4, can also be considered an indicator of convergent validity.

The evidence of discriminant validity demonstrates that each of the analyzed constructs is unique and distinct from other constructs. The results comparing model fit show how the obtained model is superior to others (see Table 3 in the supplementary material); it surpasses the confidence interval test (Anderson & Gerbing, 1988) (see Table S4 in the supplementary material); and the HTMT ratio is below 0.9 (Table S5, supplementary material). However, Fornell and Larcker's criterion (1981) is not met, as the average extracted variances for each factor are not greater than the squared correlations between each pair of factors (see Table S6 in the supplementary material).

# Discussion

The present study shows evidence in favour of the reliability and validity of the Spanish version of the MHLq young people: MHLq-E, being the first questionnaire that address MHL in Spain as a whole construct and developed in a representative population of adolescents. MHLq-E allows to obtain a global indicator of MHL, as well as the adolescent's knowledge about mental health regarding causes and symptoms, attitudes or presence of stigma, and help-seeking skills when facing mental problems.

MHLq-E is composed of 4 dimensions:

- 1) Help-seeking and skills. This refers to the different skills and strategies adolescents have for seeking specialised help or coping with mental health problems, both firstperson or if a friend had it (e.g. "If a friend had a mental disorder I would encourage him/her to seek medical help"; "If I myself had a mental disorder I would seek help from my friends"). The most reliable indicator for Help Seeking is item 19 "If a friend of mine developed a mental disorder. I would encourage him or her to seek medical help", while the least reliable is item 28 "If a friend of mine developed a mental disorder, I would tell a teacher or tutor". In this sense, it should be noted that in the search for help, the role of specialised help from psychiatrists or psychologists is clear, but in childhood and adolescence the educational environment also plays a fundamental role in mental health. Greater promotion and representation of counselling services among teachers should be taken into account. Trust in teachers and adults should also be a key factor in help-seeking, although this has perhaps theoretically been less taken into account.
- 2) Stigma. It includes attitudes, prejudices, and stereotypes that adolescents typically hold regarding mental disorders (e.g., 'People with mental disorders come from families with little money'; 'Depression is not a real mental disorder'). The most reliable item of the dimension is 17 "Only adults have mental disorders", and the least reliable is item 25 "Depression is not a real mental disorder". This reflects the unitary character of the assessment, focusing on mental disorders in general and not on depression for which specific literacy questionnaires exist such as the Depression literacy questionnaire (D-lit) (Darraj et al., 2016) or the Adult help for suicidal youth (AHSY) (Schmeekl-Cone et al., 2012).
- 3) Knowledge: Causes. It refers to what adolescents know regarding the causes or explanations they attribute to mental disorders (e.g., 'Alcohol consumption can cause mental disorders'; 'Talking about problems with someone helps improve mental health').
- 4) Knowledge: Symptoms. Similar to the previous factor, this refers to what adolescents know, but in this case, it concerns the symptomatology of various mental disorders (e.g., 'Mental disorders affect people's thoughts'; 'A person with anxiety may feel panic in situations they fear'). Concerning the Knowledge Causes, the most reliable is item 16 "The earlier mental disorders are

identified and treated, the better", and the least reliable is item 21 "Following a balanced diet helps to improve mental health". Finally, in the Knowledge Symptoms, the most reliable item was 27 "Mental disorders affect people's thoughts", while the least reliable was item 24 "The duration of symptoms is an important aspect in determining whether or not a person has a mental disorder". This seems to reflect the conception of mental health from a complete prism, where early identification is clear and shows some confusion about the importance of diet as a cause of mental disorders, with less saturation of this item in the causes dimension. In addition, it may also reflects the lesser importance of the duration of symptoms as opposed to one of the main characteristics of symptomatology in mental health such as cognitive impairment.

It should be noted that the dimensions of the MHLq-E are not the ones found in the original version of the questionnaire (Campos et al., 2016), in which they identified 3 sub-scales: (1) help-seeking and first aid skills; (2) knowledge/stereotypes on mental health problems; (3) self-help strategies. However, the proposed 4-factor structure aligns with these results, as the structure proposes to divide the dimension of knowledge (2) into causes and symptoms (3. Knowledge: Causes; 4. Knowledge: Symptoms), as well as where items related to self-help actually have a stronger relationship with the causes of mental health problems (e.g., "Physical exercise helps improve mental health") rather than with the response or ability to self-help (e.g., "If I myself had a mental health problem, I would seek help from my family"). Additionally, in a later version for young adults of the MHLq and its abbreviated version tested in various countries (Campos et al., 2022; Dias et al., 2018), a 4-factor structure is also supported, similar to the one found in the MHLq-E.

On the other hand, item 24 of the original questionnaire "If a friend of mine developed a mental disorder, I would not be able to help him or her" was removed because statistical indices did not support its good performance. This item was probably confusing because it was phrased as a double negative, additionally there are other similar items that address a similar concept in the questionnaire so it could be repetitive.

## **Reliability and validity**

In terms of reliability, sufficient evidence has been obtained contributing to the assertion that the 4 dimensions composing it exhibit adequate internal consistency, sufficient reliability of individual indicators, and adequate construct reliability. These results are consistent with the theoretical foundation of the original construct, which emphasizes the dimension of knowledge in the MHL, regarding the causes of disorders, and the recognition of their symptomatology (Jorm et al., 1997), however it maintains the current emphasis on help-seeking and the presence of stigmatizing beliefs more related with health outcomes (Kutcher et al., 2015). Different existing reviews support the existence of the MHL construct with different dimensions (Barros et al., 2023; Kucera et al., 2023; O'Connor et al., 2014; Wei et al., 2015, 2016), where knowledge can be divided into causes and symptoms, as in our questionnaire, as well as even help can be concretized in self or others (Jorm, 2012).

Regarding convergent validity, the factor loadings of the indicators are significant and above 0.4, suggesting that the indicators are positively and significantly associated with the latent construct, which is a good indicator of convergent validity. However, the evidence obtained raised questions regarding the average variance extracted, which did not surpass the desired threshold of 0.5, potentially indicating that the proposed indicators might be adequate but possibly incomplete. Furthermore, concerning discriminant validity, there was a discrepancy when applying the Fornell and Larcker criterion (1981). This discrepancy might be due to the presence of causal relationships between constructs. For instance, the complexity of relationships between constructs or the presence of unaccounted latent variables. In relation to both results, it is necessary to note that although MHL can be understood as a unitary construct, its study originally began by focusing on knowledge associated with mental health (Jorm et al., 1997), gaining importance over time on stigma and skills (Kutcher et al., 2015), which have traditionally been assessed and intervened upon independently. Therefore, all the MHL sub-dimensions indicated in the questionnaire can indeed be understood (and evaluated) as independent variables, potentially explaining the results obtained in the average variance extracted and the discrepancy in the Fornell and Larcker criterion (1981).

#### **Limitations and future studies**

There are several limitations to the study. In relation to the type of sampling, there is a lack of access to populations of low socio-economic status as well as truly rural populations, probably due to the online methodology employed. On the other hand, although the sample size (1000 participants) is considerable, there is low participation of adolescents of non-binary gender or who do not identify as male or female, as well as adolescents attending public schools or with mental health problems. This may have affected the results and perhaps it would be interesting to carry out future analyses with specific incidental samples from the aforementioned groups. Another limitation of the study is due to the influence of social desirability in the responses that could have affected the results, although this is an inherent problem with the use of self-report questionnaires. Finally, despite the measures taken to ensure the quality of the responses (ISO 20252), the validity of the responses of parents/guardians and adolescents could be affected by the nature of the questions or by the context in which they are answered (virtual environments, feelings of shame or guilt etc.). It is recommended that future research expand the sample to improve representativeness and continue to analyse the dimensionality of the proposed instrument to refine its accuracy and usefulness in the assessment of MHL in adolescents.

#### Conclussion

To our knowledge MHLq-E is the first instrument that assess the MHL as a whole and its different dimensions in Spain. MHLq-E is presented as a useful and valid instrument. The obtained results provide fundamental insights that can facilitate the design of more effective interventions and the ongoing evaluation of programs aimed at improving mental health in this population. The use of MHLq-E enables the identification of areas for improvement in understanding mental health, attitudes toward mental disorders, and help-seeking skills, which are essential for developing more effective strategies tailored to the needs of Spanish adolescents.

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**Research interests** The research interests of the team are related to knowing aspects of the mental health of children and adolescents, having valid instruments to assess the mental health of Spanish children and adolescents, and those co Artículo\_MHLQ1\_Caixa\_CJAL\_Titule2nstructs linked to psychology (assessment and treatment; developmental) and pedagogy.

Author contributions CGS conceived of the study, participated in its design and coordination and drafted the manuscript; JR-M participated in the design, performed the statistical analysis and interpretation of the data; AA-L and LV-L contributed to drafting the manuscripts, particularly in the methodology, discussion, limitations, and conclusions All authors read and approved the final manuscript.

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**Data Availability** The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

#### Declarations

Ethics statement The studies involving humans were approved by Ethics Committee of University of Valladolid PI 23-3245NOHCUV.

The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided informed consent to participate in this study.

**Competing interests** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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