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Mental health literacy questionnaire-short version for adults (MHLq-SVa): validation study in China, India, Indonesia, Portugal, Thailand, and the United States

Luísa Campos^{1,2*}, Pedro Dias^{1,3}, Marisa Costa^{1,2}, Laura Rabin⁴, Rona Miles⁴, Sumi Lestari⁵, Rania Feraihan⁵, Neera Pant⁶, Natthaphansan Sriwichai⁷, Waraporn Boonchieng⁸ and Luxi Yu⁹

Abstract

Background: Mental Health Literacy (MHL) has become a focus of research in recent decades, as a prerequisite for early identification and intervention for mental health problems. Although several instruments have been developed for assessing MHL, there is a need for brief and psychometrically sound measures to capture important aspects of MHL in large and diverse adult samples. The present study aimed to: (1) provide a revised and shorter version of a previously validated questionnaire for assessing MHL; and (2) examine the psychometric properties of the MHLq-SVa in student samples from six different countries (China, India, Indonesia, Portugal, Thailand, and United States).

Methods: The study involved 2180 senior school and undergraduate students, aged between 17 and 25 years old, from China, India, Indonesia, Portugal, Thailand, and the United States. Participants responded to the Mental Health Literacy Questionnaire for young adults (MHLq-ya), in their native language, following its translation and adaptation for each culture. The MHLq-ya comprises 29 items, organized into four dimensions: Knowledge of mental health problems; Erroneous beliefs/stereotypes; First-aid skills and help-seeking behavior; Self-help strategies. Confirmatory factor analyses and internal consistency analyses were performed on the combined data.

Results: Data from the different countries supported a shorter version of the questionnaire (MHLq-SVa), composed of 16 items that fit with previously defined dimensions. Internal consistency and between-factor correlations further supported the adequacy of the instrument's psychometric properties.

Conclusion: The study provided preliminary support for the construct validity and reliability of the MHLq-SVa as a measure for assessing MHL in young adults from six different countries and languages. Future studies are needed to further validate the measure and undertake multicultural comparisons of MHL in diverse samples from around the globe.

Keywords: Mental Health literacy, Questionnaire, Undergraduate students, Short version, Validation, Portugal, USA, China, Thailand, India, Indonesia

*Correspondence:
Luísa Campos
mcampos@ucp.pt

Full list of author information is available at the end of the article



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Background

According to the Global Burden of Disease Study, in 2019 approximately 792 million people presented mental health problems, a number that rises to 970 million people if substance use is included [1]. In recent years, several studies [2, 3] have reported an increase in the prevalence of these problems. The estimated prevalence rates of mental health problems and substance use vary widely by region and country: for example, in the US, the estimated rate was 16.9%; in Portugal, 18.5%; in eastern countries, rates tend to be lower (e.g., Thailand, 12.0%; China, 11.3%; India, 13.7%; Indonesia, 10.7%) [4]. The COVID-19 pandemic led to a global increase of mental health problems, particularly stress, depressive and anxious symptoms [5, 6], suggesting an increased need for mental health assessment as well as the provision of services and efficacious interventional programmes.

The increasing prevalence of mental health problems globally suggests the need to adopt preventative measures, as early detection of signs and symptoms increases the probability of success in terms of treatment outcomes [7–13]. One relevant resource for the prevention of mental health problems is Mental Health Literacy (MHL), a multifactorial construct encompassing: (1) knowledge related to the prevention of mental health problems; (2) recognition of signs and symptoms (i.e., being able to identify the onset of problem development); (3) identification of available options and treatments; and (4) knowledge of tailored self-help strategies and first-help skills to support others who are developing and/or present with mental health problems [9]. Low levels of MHL have been found to be related to difficulties in recognizing mental health problems (whether in oneself or in others) [12], delay in seeking help, inadequate use of resources and action strategies, as well as communication difficulties with health professionals and lower adherence to treatments [2, 14–17].

Research has examined the role of variables that potentially influence MHL levels, namely gender [7, 18], proximity to someone with mental health problems [3, 19–22] and culture [23, 24]. The results of these studies indicate that young female adults [3, 25–28] and people with proximity to people with mental health problems [7, 15, 18, 29–32] tend to present higher levels of MHL. With regard to culture and its influence on MHL, factors such as personal beliefs, religion, language, cultural diversity and subjective experience seem to influence knowledge about mental health problems [9, 23, 33, 34]. Studies that compared the MHL levels of participants from different countries and regions found that participants from western and developed regions presented higher levels of MHL, in comparison to participants from developing regions [8, 35].

Several instruments have been developed to assess MHL (see reviews [27, 36]), some of them focusing on specific dimensions (e.g., knowledge; stigmatizing perceptions) or specific mental health problems or diagnoses (e.g., schizophrenia; depression) [7]. Taking into account the updated construct of MHL [9], and limitations of previous measures (e.g., use of time-consuming vignettes, measures limited to specific mental health problems), a new instrument to provide a more up-to-date assessment of this construct was developed for assessing MHL in young people (Mental Health Literacy questionnaire – young people form; MHLq-YP; [7]). In 2018, Dias and collaborators adapted this questionnaire for young adults – the Mental Health Literacy questionnaire-young adult form; MHLq-YA. The MHLq-YA includes 29 items, rated on a five-point Likert-type scale, organized into four dimensions: (1) knowledge of mental health problems, (2) erroneous beliefs/stereotypes, (3) first aid skills and help seeking behaviour, and (4) self-help strategies. The preliminary study of this instrument's psychometric properties showed appropriate levels of validity and internal consistency [18].

Given the increasing need to assess MHL among young adults and given time constraints when undertaking such assessments, the current study aimed to expand the analysis of the psychometric properties of the MHLq-YA to provide a revised and shorter version. In addition, we examined the psychometric properties of this short version in student samples from six different countries (China, India, Indonesia, Portugal, Thailand, and United States).

Methods

Participants

The study involved 2180 senior school and undergraduate students, aged between 17 and 25 years old, from six different countries – China, India, Indonesia, Portugal, Thailand, and the United States.

The sample from China included 496 undergraduates (63% female), aged from 17 to 22 years ($M=19.00$; $SD=0.84$). The sample from India included 284 undergraduate students (63% female), aged between 18 and 25 years ($M=20.85$; $SD=1.85$). The Indonesian sample included 197 undergraduate students (63% female), aged between 18 and 23 years ($M=19.08$; $SD=1.28$). The Portuguese sample included 382 undergraduate students (53% female), aged between 17 and 25 years ($M=21.21$; $SD=2.15$). The Thai sample included 385 undergraduate students (70% female), aged between 18 and 24 years ($M=20.26$; $SD=1.30$). The United States sample included 436 undergraduate students aged between 18 and 25 years ($M=20.60$; $SD=1.99$; 60% female).

Procedure

Prior to data collection, the MHLq-YA was translated into the predominant language of each country, following the guidelines for translating and adapting items [37]: (1) translation from English or Portuguese by a bilingual translator; (2) back-translation by a different bilingual translator; (3) pilot testing of items, through think aloud procedures (Thailand) or comprehension rating using a 3-point scale questionnaire (China); (4) semantic comparison of the translation and back-translation; (5) review by experts in psychometrics and linguistics (India, Indonesia, and Thailand); (6) analysis of the translated version by the Portuguese research team.

Participants' recruitment occurred through in person contact with students (Portugal, US, and Thailand) and through online dissemination (China, India, Indonesia, Portugal, Thailand, and US).

The study followed ethical guidelines in each country with all participants providing written informed consent. The sociodemographic and MHLq-YA forms were self-administered using online platforms (India, Indonesia, Thailand), in-person paper-and pencil questionnaires (China, US), or both (Portugal). Data collection occurred both prior to (Portugal, Thailand, and US) and during (China, Thailand, India and Indonesia) the COVID-19 pandemic.

Instruments

The protocol included a sociodemographic section, comprising self-reported questions about gender and age, and the MHLq-YA.

Mental Health literacy questionnaire – young adult form (MHLq-YA)

The original version of MHLq-YA [18] included 29 items, developed to measure MHL on four dimensions: (1) knowledge of mental health problems (e.g., “A person with depression feels very miserable.”; “People with schizophrenia usually have delusions.”), (2) erroneous beliefs/ stereotypes (e.g., “Mental disorders don't affect people's behaviors.”; “People with mental disorders belong to low-income countries.”), (3) help-seeking and first aid skills (e.g., “If I had a mental disorder, I would seek my relatives' help.”; “If someone close to me had a mental disorder, I would encourage her/him to look for a psychologist.”, and (4) self-help strategies (e.g., “Physical exercise contributes to good mental health.”; “Sleeping well contributes to good mental health.”). Participants were asked to rate each item, ticking the option that indicates how much they agree or disagree, using a five-point scale (ranging from 1=Strongly Disagree to 5=Strongly Agree) was used to respond to the items. Cronbach's Alpha for the total scale in the adaptation study was 0.84.

Data analysis

Considering the preliminary evidence from the MHLq-YA study [18], first we performed a confirmatory factor analysis (CFA) on the original structure with the Portuguese sample. For CFA analyses, we used AMOS software (SPSS Inc, Chicago, IL, version 27.0) and the estimation method chosen was maximum likelihood (ML). Following the theoretical recommendations, to evaluate the goodness of fit of models, we used the following global indexes: Chi-square (X^2) and Chi-square difference (X^2/gl); Non-Normed Fit Index (NNFI) and Comparative Fit Index (CFI); and Root Mean Squared Error of Approximation (RMSEA). The standard value for CFI is equal to or greater than 0.95, and lower or equal to 0.08 for RSMEA [38–40]. For the analysis of local adjustment and item elimination, in addition to factor loadings, we also considered the magnitude of the Squared Multiple Correlation Coefficient (R^2), the variances and covariance, and the amount of error associated [38, 39]. Taking into account the limitations in several items identified in the exploratory study [18], and the above mentioned local adjustment indices, elimination of items would be considered, resulting in a shortened version of MHLq-YA to be tested with the samples from China, India, Indonesia, Thailand, and the United States.

For the calculation of total score, items from “erroneous beliefs/stereotypes” dimension were reverse-scored. Internal consistency was analysed in all samples through Cronbach's Alpha and McDonald's Omega [41], as well as the interrelation among subscales, using SPSS (SPSS Inc, Chicago, IL, version 27.0). McDonald's Omega coefficient provides more accuracy to the approximation of internal reliability, when compared to Cronbach's Alpha. Standard values stipulate that McDonald's Omega values above 0.70 are acceptable, and, for Cronbach's Alpha, a coefficient of 0.60 is the cut-off for a measure to be considered internally reliable [42]. Statistical significance was set at $p < .05$.

Results

Confirmatory factor analyses

The construct validity of the MHLq-YA was tested by performing a CFA with the Portuguese sample. Considering the previous results of the exploratory study of psychometric properties [18], local adjustment indicators, as well as the global adjustment, 13 items were removed from the model, namely: MHLq2, MHLq3, MHLq4, MHLq5, MHLq9, MHLq10, MHLq12, MHLq11, MHLq14, MHLq18, MHLq21, MHLq23 and MHLq24. Also, the modification indices specified the correlations between the errors of MHLq06 and MHLq13 items, the MHLq08 and MHLq17 items, as well as MHLq01 and MHLq19.

The revised version of MHLq-YA, now named Mental Health Literacy questionnaire- Short Version for adults (MHLq-SVa), fit well to the Portuguese data ($X^2(95)=153.17 \times 2/gl=1.62$; CFI=0.95; NNFI=0.95 RMSEA=0.040). At the level of local adjustment, the factorial weights were globally high, ranging between 0.50 and 0.97 (Table 1).

The quadri-dimensional model showed similar goodness-of-fit indices in US ($X^2(95)=206.547 \times 2/gl=2.17$; CFI=0.97; NNFI=0.96; RMSEA=0.052), China ($X^2(95)=186.190 \times 2/gl=1.96$; CFI=0.95; NNFI=0.94; RMSEA=0.044), Thailand ($X^2(95)=180.768 \times 2/gl=1.90$; CFI=0.95; NNFI=0.94; RMSEA=0.048), India ($X^2(95)=257.482 \times 2/gl=2.71$; CFI=0.88; NNFI=0.85; RMSEA=0.072) and Indonesia ($X^2(95)=183.044 \times 2/gl=1.92$; CFI=0.95; NNFI=0.94; RMSEA=0.051). The model also showed a good local adjustment in these five countries (Table 1), with items loadings ranging from 0.20 to 0.93 and globally good R^2 values (above 0.30). The standardized loadings revealed some concerns in two countries, regarding items MHLq13 (Indonesia), MHLq15, and MHLq27 (India).

Reliability

The reliability of MHLq-SVa for each country is reported in Table 2. Both Alpha and Omega coefficients for each dimension and total score were close, ranging from 0.59 to 0.93.

The correlations between dimensions and the total score of MHLq-SVa (Table 3) ranged from -0.29 to 0.92 . As expected, considering the nature of the items included in dimension 2 (erroneous beliefs/stereotypes), negative correlations were found between this dimension and the other three dimensions and the total score in all countries, except India.

Discussion

The current study aimed to provide evidence of the psychometric properties of a shorter version of the MHLq-YA in six different countries (Portugal, US, China, Thailand, India, and Indonesia).

Following the preliminary study of the psychometric properties of the MHLq-YA [18], where some items presented psychometric issues (e.g., items loading simultaneously in two factors; acceptable, but low loading values), a CFA was conducted with the Portuguese sample, suggesting the exclusion of 13 items. This resulted in a shorter version of the measure, with 16 items organized in four dimensions – Knowledge of mental health problems; Erroneous beliefs/stereotypes; Help-seeking and first aid skills; Self-help strategies – in line with the most recent definition of the MHL construct [9]. This shortened version of MHLq-YA was tested with data from five countries (US, China, Thailand, India, Indonesia). The

data from these different countries globally fit the four-factor model tested. The interrelations between factors and total score confirmed the questionnaire's consistency, with significant contributions of each dimension to the latent construct – MHL. According to the reference values [42], the internal consistency was globally acceptable in each country. The US data shown the highest internal consistency values. This revised version of the MHLq showed a good psychometric structure to be used as an assessment tool of MHL in six countries.

This study has two major strengths. First, it allowed for the development of a shorter version of a questionnaire for assessing MHL in young adults, which will be easier to administer, less time consuming to score, and less burdensome for participants. Second, this was the first time that this questionnaire was tested in different cultures, from distinct regions (Europe, North America, and Asia), in languages spoken in countries with large populations, facilitating future research focused on multicultural comparisons of MHL. There are also limitations. The sample sizes of each country varied significantly, potentially compromising comparative analyses, such as measurement invariance. Data collection procedures (paper-pencil vs. online) and timing (pre and during COVID-19 pandemic) differed between countries. The fact that some data were collected during the pandemic could have influenced participants' responses, since mental health awareness is thought to have increased during this period (e.g., [43,44]). The difference in data collection procedures could have also affected data comparison between countries, since online and paper-pencil administration could result in different responses, particularly regarding the knowledge dimension, as answers to these items could be found online.

Future studies should address and overcome the limitations stated above, but also contribute to the strengthening and applicability of this instrument. First, considering the concerns regarding the factor loadings of some items, as well as the non-significant correlation between Factor 2 and Factors 1 and 3 in India, new data collection and analyses should be developed in India and Indonesia, in order to explore the need to revise item translation or make cultural adjustments. Second, other instruments should be considered, not only to control social desirability, but also to further study the MHL construct by means of examining concurrent validity (e.g., Mental Health Literacy Scale; [45]). Third, data collection procedures (online vs. paper-pencil) should be compared in order to examine possible differences between them. Fourth, data collection should be extended to more heterogeneous groups of participants (e.g., different age groups, different educational backgrounds, clinical samples), assuring equivalent sample sizes. Fifth, it would be interesting to test the psychometric properties of this measure with

Table 1 Standardised Factor Loadings, Standardised Error and Squared Multiple Correlations for China, India, Indonesia, Portugal, Thailand, and US.

Dimension/ Items	Portugal			US			China			Thailand			India			Indonesia					
	SL	SE	R ²	SL	SE	R ²	SL	SE	R ²	SL	SE	R ²	SL	SE	R ²	SL	SE	R ²			
Knowledge of mental health problems																					
MHLq25 "Mental disorders affect people's thoughts"	0.57	0.12	0.33	0.74	0.13	0.54	0.71	0.12	0.53	0.63	0.09	0.42	0.60	0.20	0.36	0.58	0.11	0.34			
MHLq27 "A person with schizophrenia may see and hear things that nobody else sees and hears"	0.57	0.15	0.33	0.72	0.12	0.53	0.40	0.12	0.15	0.52	0.12	0.27	0.25	0.18	0.07	0.48	0.17	0.23			
MHLq20 "One of the symptoms of depression is the loss of interest or pleasure in most things"	0.54	0.14	0.29	0.69	0.12	0.48	0.46	0.12	0.19	0.63	0.11	0.39	0.37	0.18	0.14	0.60	0.14	0.37			
MHLq28 "Highly stressful situations may cause mental disorders"	0.53	0.13	0.28	0.66	0.11	0.44	0.65	0.11	0.40	0.65	0.10	0.44	0.68	0.19	0.46	0.40	0.15	0.16			
MHLq16 "Changes in brain function may lead to the onset of mental disorders"	0.55		0.30	0.59		0.35	0.54		0.28	0.62		0.38	0.41		0.17	0.56		0.31			
MHLq22 "The symptoms' length is one of the important criteria for the diagnosis of a mental disorder"	0.51	0.15	0.26	0.48	0.10	0.23	0.48	0.12	0.24	0.59	0.09	0.34	0.50	0.20	0.25	0.60	0.14	0.36			
Erroneous beliefs/stereotypes																					
MHLq15 "Only adults have mental disorders"	0.68		0.46	0.86		0.74	0.39		0.05	0.64		0.25	1.96		3.83	0.82		0.67			
MHLq13 "Mental disorders don't affect people's feelings"	0.54	0.17	0.29	0.69	0.06	0.48	0.70	0.73	0.07	0.81	0.24	0.26	0.20	0.17	0.04	1.00	0.15	0.99			
MHLq06 "Mental disorders don't affect people's behaviors"	0.59	0.15	0.35	0.72	0.06	0.52	0.48	0.57	0.05	0.73	0.23	0.29	0.25	0.21	0.06	0.81	0.15	0.66			
Help-seeking and first aid skills																					
MHLq8 "If I had a mental disorder, I would seek for a psychologist's help"	0.68		0.46	0.82		0.67	0.92		0.66	0.76		0.50	0.79		0.62	1.04		1.07			
MHLq17 "If someone close to me had a mental disorder, I would encourage her/him to see a psychiatrist"	0.97	0.18	0.94	0.94	0.06	0.88	0.72	0.05	0.36	0.76	0.08	0.52	0.88	0.10	0.77	0.77	0.05	0.59			
MHLq29 "If I had a mental disorder, I would seek for a psychiatrist's help"	0.62	0.25	0.38	0.88	0.07	0.80	0.79	0.07	0.82	0.82	1.00	0.73	0.68	0.10	0.46	0.75	0.13	0.56			
Self-help strategies																					
MHLq7 "Sleeping well contributes to a good mental health"	0.62	0.17	0.39	0.79	0.07	0.62	0.64	0.07	0.41	0.70	0.16	0.48	0.64	0.11	0.41	0.72	0.64	0.51			
MHLq19 "A balanced diet contributes to a good mental health"	0.58	0.22	0.34	0.79	0.07	0.61	0.68	0.09	0.46	0.76	0.19	0.59	0.66	0.10	0.43	0.63	0.64	0.40			
MHLq1 "Physical exercise contributes to a good mental health"	0.49	0.16	0.24	0.78	0.08	0.59	0.34	0.10	0.12	0.58	0.16	0.37	0.54	0.10	0.29	0.49	0.44	0.24			
MHLq26 "Doing something enjoyable contributes to a good mental health"	0.50		0.25	0.73		0.54	0.72		0.51	0.50		0.25	0.60		0.36	0.32		0.10			

SL – Standardised Loadings, SE – Standardised Error, R² – Squared Multiple Correlations

Table 2 Descriptive Statistics of MHLq-SVa Dimensions, Cronbach’s alpha and McDonald’s Omega

MHLq Dimensions	Items	Portugal		US		China		Thailand		India		Indonesia	
		α	Ω	α	Ω	α	Ω	α	Ω	α	Ω	α	Ω
Knowledge of mental health problems	6	0.72	0.71	0.83	0.83	0.72	0.71	0.79	0.78	0.66	0.64	0.76	0.75
Erroneous beliefs/stereotypes	3	0.67	0.67	0.83	0.83	0.59	0.65	0.76	0.76	0.72	0.72	0.89	0.89
Help-seeking and first aid skills	3	0.69	0.75	0.91	0.92	0.81	0.83	0.81	0.82	0.81	0.82	0.84	0.87
Self-help strategies	4	0.66	0.68	0.86	0.86	0.67	0.66	0.74	0.75	0.72	0.72	0.60	0.67
MHLq Total	16	0.82	0.80	0.93	0.93	0.80	0.77	0.86	0.84	0.81	0.73	0.82	0.78

α - Cronbach’s Alpha ; Ω - McDonald’s Omega

Table 3 Means, Standard Deviations and Correlations Among MHLq Dimensions and Total Score

	Portugal				
	M(SD)	2.	3.	4.	5.
1. Knowledge of mental health problems	4.05 (.48)	-.46**	.22**	.51**	.83**
2. Erroneous beliefs/stereotypes	1.69 (.68)		-.17**	-.39**	-.71**
3. Help-seeking and first aid skills	4.10 (.66)			.21**	.53**
4. Self-help strategies	4.29 (.49)				.73**
5. MHLq Total	4.17 (.39)				
US					
	M(SD)	2.	3.	4.	5.
1. Knowledge of mental health problems	3.86 (.85)	-.68**	.54**	.76**	.92**
2. Erroneous beliefs/stereotypes	1.71 (1.07)		-.39**	-.65**	-.80**
3. Help-seeking and first aid skills	3.77 (1.18)			.54**	.73**
4. Self-help strategies	3.95 (.99)				.89**
5. MHLq Total	3.94 (.83)				
China					
	M(SD)	2.	3.	4.	5.
1. Knowledge of mental health problems	3.92 (.55)	-.29**	.25**	.41**	.82**
2. Erroneous beliefs/stereotypes	1.74 (.64)		-.09	-.22**	-.55**
3. Help-seeking and first aid skills	4.29 (.67)			.43**	.60**
4. Self-help strategies	4.58 (.45)				.71**
5. MHLq Total	4.21 (.39)				
Thailand					
	M(SD)	2.	3.	4.	5.
1. Knowledge of mental health problems	3.98 (.51)	-.33**	.52**	.46**	.85**
2. Erroneous beliefs/stereotypes	1.82 (.72)		-.28**	-.20**	-.61**
3. Help-seeking and first aid skills	4.21 (.63)			.37**	.72**
4. Self-help strategies	4.23 (.53)				.69**
5. MHLq Total	4.13 (.42)				
India					
	M(SD)	2.	3.	4.	5.
1. Knowledge of mental health problems	3.89 (.62)	.00	.42**	.58**	.86**
2. Erroneous beliefs/stereotypes	2.24 (1.12)		-.14*	-.08	-.08
3. Help-seeking and first aid skills	4.41 (.84)			.58**	.76**
4. Self-help strategies	4.44 (.66)				.85**
5. MHLq Total	4.18 (.56)				
Indonesia					
	M(SD)	2.	3.	4.	5.
1. Knowledge of mental health problems	4.12 (.55)	-.29**	.32**	.37**	.75**
2. Erroneous beliefs/stereotypes	2.36 (1.41)		-.16*	-.21**	-.75**
3. Help-seeking and first aid skills	4.30 (.71)			.20**	.54**
4. Self-help strategies	4.34 (.52)				.58**
5. MHLq Total	4.12 (.50)				

*p < .05; ** p < .01.

samples from other countries and languages, from other regions, such as South America and Africa. Sixth, using larger samples, measurement invariance should also be examined. Finally, a multi-method approach could be used in future research, highlighting the extent to which perceptions are consistent with others' reports in different cultures.

Conclusion

Preliminary validation of the MHLq-SVa suggests that it is a valid and reliable measure for assessing MHL in young adults from six different countries and languages (Portugal – Portuguese, US – English, China – Chinese, Thailand – Thai, India - Hindi, and Indonesia – Indonesian). Future studies are needed to test measurement invariance and other relevant psychometric properties, allowing multicultural comparisons of MHL.

Abbreviations

CFI	Comparative Fit Index
CFA	Confirmatory Factor Analysis
ML	Maximum Likelihood
MHL	Mental Health Literacy
MHLq-YA	Mental Health Literacy questionnaire for young adults
MHLq-SVa	Mental Health Literacy questionnaire – Short Version for adults
NNFI	Non-Normed Fit Index
RMSEA	Root Mean Squared Error of Approximation
R2	Squared Multiple Correlation Coefficient.

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Authors' contributions

LC and PD originated the idea. All authors, with the exception of MC, contributed to data collection. MC, LC, and PD performed data analysis. LC, PD, and MC wrote the first manuscript draft. All authors contributed data and participated in the interpretation of the results and writing and critical reviewing of the manuscript. All authors read and approved the final manuscript.

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Data availability

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

All participants provided written informed consent. Furthermore, all were in accordance with the ethical standards of the institutional and/or national research committees and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The studies were approved by the Institutional Review Board or equivalent of each university (Portugal – Research Ethics Committee CRP-UCP- ref. CE.C.4.2018; USA – 2016 – 1018, Brooklyn College, CUNY Integrated IRB; China – Academic Affairs Office of Guizhou Medical University – ref. JG202022; Thailand – Committee of

Research Ethic of the Faculty of Public Health, Chiang Mai University - ET 001/2020; India – Department of Psychology, Gargi College, University of Delhi – ref. GC/NPPSY/2020; Indonesia – Based on articles 47 and 49 of the national Code of Ethics that was written and enforced by the Indonesian Psychological Association (Himpsti, 2010), IRB or another special committee is a non-compulsory as long as Informed Consent is applied on human subjects and contains information needed. Informed consent was obtained from all participants and the research was supervised by the Research and Community Service Foundation of Psychology-University of Brawijaya.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

Author details

- ¹Research Centre for Human Development, Universidade Católica Portuguesa, R. Diogo Botelho, 1327, 4169-005 Porto, Portugal
- ²Faculty of Education and Psychology, Universidade Católica Portuguesa, R. Diogo Botelho, 1327, 4169-005 Porto, Portugal
- ³Department of Psychology, University of the Azores, Rua da Mãe de Deus, 9500-321 Ponta Delgada, Portugal
- ⁴Department of Psychology, Brooklyn College of The City University of New York, 2900 Bedford Avenue, 11210 Brooklyn, NY, USA
- ⁵Psychology, Faculty of Social and Political Sciences, University of Brawijaya, 65145 St.Veteran, Malang City, East Java, Indonesia
- ⁶Gargi College, University of Delhi, Siri Fort Road, 110049 New Delhi, India
- ⁷Thanyarak Chiangmai Hospital, 182 Moo 7, Ki Lek, Mae Rim, Chiang Mai 50180, Thailand
- ⁸Faculty of Public Health, Chiang Mai University, Chiang Mai, Thailand
- ⁹Medical Psychology Teaching and Research Section School of Medical Humanities, Guizhou Medical University, Guizhou, China

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References

- Institute for Health Metrics and Evaluation. Global burden of disease study. (2019) results. In: Global burden of disease collaborative network. 2021. <https://ourworldindata.org>. Accessed 4 March 2022.
- Stewart G, Kamata A, Miles R, Grandoit E, Mandelbaum F, Quinn C, Rabin L Predicting mental health help seeking orientations among diverse undergraduates: an ordinal logistic regression analysis. *J. Affect. Disord.* 2019; <https://doi.org/10.1016/j.jad.2019.07.058>.
- Tay JL, Tay YF, Klainin-Yobas P. Mental health literacy levels. *Arch. Psychiatr. Nurs.* 2018; <https://doi.org/10.1016/j.apnu.2018.04.007>.
- Dattani S, Ritchie H, Roser M. Mental Health. In: our world on data. 2021. <https://ourworldindata.org/mental-health>. Accessed 9 March 2021.
- Alzueta E, Perrin P, Baker FC, Caffarra S, Ramos-Usuga D, Yuksel D, Arango - Lasprilla JC. How the COVID - 19 pandemic has changed our lives: a study of psychological correlates across 59 countries. *J Clin Psychol.* 2020;77:556 – 70.
- Nochaiwong S, Ruengorn C, Thavorn K, Hutton B, Awiphan R, Phosuya C, Ruanta Y, Wongpakaran N, Wongpakaran T. Global prevalence of mental health issues among the general population during the coronavirus disease-2019 pandemic: a systematic review and meta-analysis. *Sci Rep.* 2021. <https://doi.org/10.1038/s41598-021-89700-8>.
- Campos L, Dias P, Palha F, Duarte A, Veiga E. Development and psychometric properties of a new questionnaire for assessing Mental Health Literacy in young people. *Univ Psychol.* 2016;15:61–72. <http://www.scielo.org.co/pdf/rups/v15n2/v15n2a06.pdf>.
- Furnham A, Hamid A. "Mental health literacy in non-western countries: a review of the recent literature". *Ment Health Rev J.* 2014. <https://doi.org/10.1108/MHRJ-01-2013-0004>.
- Jorm AF. Mental health literacy: empowering the community to take action for better mental health. *Am Psychol.* 2012. <https://doi.org/10.1037/a0025957>.
- Kessler RC, McGonagle KA, Zhao S, Nelson CB, Hughes M, Eshleman S, Wittchen HU, Kendler KS. Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the United States. Results from the National

- Comorbidity Survey. *Arch Gen Psychiatry*. 1994. <https://doi.org/10.1001/archpsyc.1994.03950010008002>.
11. Kelly CM, Jorm AF, Wright A. Improving mental health literacy as a strategy to facilitate early intervention for mental disorders. *Med J Aust*. 2007. <https://doi.org/10.5694/j.1326-5377.2007.tb01332.x>.
 12. McLuckie A, Kutcher S, Wei Y, Weaver C. Sustained improvements in students' mental health literacy with use of a mental health curriculum in Canadian schools. *BMC Psychiatry*. 2014; 10.1186%2Fs12888-014-0379-4.
 13. Reavley NJ, Jorm AF. Stigmatizing attitudes towards people with mental disorders: findings from an Australian national survey of mental health literacy and stigma. *Aust N Z J Psychiatry*. 2011. <https://doi.org/10.3109/00048674.2011.621061>.
 14. Gabriel A, Violato C. The development and psychometric assessment of an instrument to measure attitudes towards depression and its treatments in patients suffering from non-psychotic depression. *J Affect Disord*. 2010;124:241–9.
 15. Jorm AF. Mental health literacy. Public knowledge and beliefs about mental disorders. *Br J Psychiatry*. 2000. <https://doi.org/10.1192/bjp.177.5.396>.
 16. Jorm AF, Barney LJ, Christensen H, Highet NJ, Kelly CM, Kitchener BA. Research on mental health literacy: what we know and what we still need to know. *Aust N Z J Psychiatry*. 2006; <https://doi.org/10.1111/j.1440-1614.2006.01734.x>.
 17. Rosenthal B, Wilson W. Mental health services: use and disparity among diverse college students. *J Am Coll Health*. 2008. <https://doi.org/10.3200/JACH.57.1.61-68>.
 18. Dias P, Campos L, Almeida H, Palha F. Mental health literacy in young adults: adaptation and psychometric properties of the mental Health Literacy Questionnaire. *Int J Environ Res*. 2018. <https://doi.org/10.3390/ijerph15071318>.
 19. Couture SM, Penn DL. Interpersonal contact and the stigma of mental illness: a review of the literature. *J Ment Health*. 2003. <https://doi.org/10.1080/09638231000118276>.
 20. Hadjimina E, Furnham A. Influence of age and gender on mental health literacy of anxiety disorders. *Psychiatry Res*. 2017. <https://doi.org/10.1016/j.psychres.2017.01.089>.
 21. Lauber C, Ajdacic-Gross V, Fritschi N, Stulz N, Rössler W. Mental health literacy in an educational elite: an online survey among university students. *BMC Public Health*. 2005;5:44.
 22. Rüsch N, Angermeyer MC, Corrigan PW. Mental illness stigma: concepts, consequences, and initiatives to reduce stigma. *Eur Psychiatry*. 2005. <https://doi.org/10.1016/j.eurpsy.2005.04.004>.
 23. Altweck L, Marshall TC, Ferenczi N, Lefringhausen K. Mental health literacy: a cross-cultural approach to knowledge and beliefs about depression, schizophrenia and generalized anxiety disorder. *Front Psychol*. 2015; <https://doi.org/10.3389/fpsyg.2015.01272>.
 24. Choudhry FR, Mani V, Ming LC, Khan TM. Beliefs and perception about mental health issues: a meta-synthesis. *Neuropsychiatr Dis Treat*. 2016; <https://doi.org/10.2147/NDT.S111543>.
 25. Furnham A, Annis J, Cleridou K. Gender differences in the mental health literacy of young people. *Int J Adolesc Med Health*. 2016. <https://doi.org/10.1515/ijamh-2013-0301>.
 26. Jung H, von Sternberg K, Davis K. Expanding a measure of mental health literacy: development and validation of a multicomponent mental health literacy measure. *Psychiatry Res*. 2016. <https://doi.org/10.1016/j.psychres.2016.06.034>.
 27. O'Connor M, Casey L, Clough B. Measuring mental health literacy: a review of scale-based measures. *J Ment Health*. 2014. <https://doi.org/10.3109/0963823.7.2014.910646>.
 28. Spiker DA, Hammer JH. Mental health literacy as theory: current challenges and future directions. *J Ment Health*. 2018. <https://doi.org/10.1080/09638237.2018.1437613>.
 29. Chandra A, Minkovitz CS. Factors that influence mental health stigma among 8th grade adolescents. *J Youth Adolesc*. 2007. <https://doi.org/10.1007/s10964-006-9091-0>.
 30. Cotton SM, Wright A, Harris MG, Jorm AF, McGorry PD. Influence of gender on mental health literacy in young Australians. *Aust N Z J Psychiatry*. 2006. <https://doi.org/10.1080/j.1440-1614.2006.01885.x>.
 31. Gulliver A, Griffiths KM, Christensen H. Perceived barriers and facilitators to mental health help-seeking in young people: a systematic review. *BMC Psychiatry*. 2010. <https://doi.org/10.1186/1471-244X-10-113>.
 32. Williams B, Pow J. Gender differences and mental health: an exploratory study of knowledge and attitudes to mental health among scottish teenagers. *Child Adol Ment*. 2007. <https://doi.org/10.1111/j.1475-3588.2006.00413.x>.
 33. Kutcher S, Wei Y, Coniglio C. Mental health literacy: past, present, and future. *Can J Psychiatry*. 2016. <https://doi.org/10.1177/0706743715616609>.
 34. Sheikh S, Furnham A. A cross-cultural study of mental health beliefs and attitudes towards seeking professional help. *Soc Psychiatry Psychiatr Epidemiol*. 2000. <https://doi.org/10.1007/s001270050246>.
 35. Mendenhall NA, Frauenholtz S. Mental health literacy: social work's role in improving public mental health. *Soc Work*. 2013. <https://doi.org/10.1093/sw/swt038>.
 36. Wei Y, McGrath PJ, Hayden J, Kutcher S. Measurement properties of tools measuring mental health knowledge: a systematic review. *BMC Psychiatry*. 2016. <https://doi.org/10.1186/s12888-016-1012-5>.
 37. Erkut S. Developing multiple language versions of instruments for intercultural research. *Child Dev Perspect*. 2010. <https://doi.org/10.1111/j.1750-8606.2009.00111.x>.
 38. Byrne BM. Structural equation modeling with AMOS: basic concepts, applications, and programming. 2nd ed. New York: Routledge; 2010.
 39. Hu L, Bentler P. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Struct Equ Model*. 1999;6:1–55.
 40. Marôco J. Análise de equações estruturais. Fundamentos teóricos, software & aplicações. Pêro Pinheiro: Report Number; 2010.
 41. McDonald RP. Test theory: a unified treatment. Mahwah: Lawrence Erlbaum; 1999.
 42. Viladrich C, Angulo-Brunet A, Dovel E. A journey around alpha and omega to estimate internal consistency reliability. *Ann Psychol*. 2017;33:755–82.
 43. Lestari R, Setyawan FE. Mental health policy: protecting community mental health during the COVID-19 pandemic. *J Public Health Res*. 2021. <https://doi.org/10.4081/jphr.2021.2231>.
 44. McKinlay AR, May T, Dawes J, Fancourt D, Burton A. "You're just there, alone in your room with your thoughts": a qualitative study about the impact of lockdown among young people during the COVID-19 pandemic. *medRxiv*. 2021. <https://doi.org/10.1101/2021.04.11.21254776>.
 45. O'Connor M, Casey L. The Mental Health Literacy Scale (MHLS): a new scale-based measure of mental health literacy. *Psychiatry Res*. 2015. <https://doi.org/10.1016/j.psychres.2015.05.064>.

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