International Health Trends and Perspectives

COVID-19 HEALTH LITERACY SCALE DEVELOPMENT

Original Research

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ABSTRACT

Objective: The purpose of this study was to develop a COVID-19 Health Literacy (HL) scale. **Material and Methods**: Data were obtained from three samples of medical students (n=628) having different demographic characteristics in different regions of Turkey. A pilot study was conducted to assess language validity. Several psychometric tests were conducted to assess the tools' reliability and validity. **Results**: A .963 Kaiser-Meyer-Olkin (KMO) value was obtained, in addition to a 72.26% variance score. The scale also demonstrated reliability values (internal consistency; α=.94). Two dimensions consisting of 20 items were identified to represent and the COVID-19 HL. **Conclusion**: The COVID-19 HL scale demonstrated robust psychometric properties. It was also deemed to be reliable and valid in assessing health literacy of COVID-19 among the medical students and will also be useful in increasing COVID-19 awareness among individuals.

KEYWORDS

Covid-19, Covid-19 Health Literacy Scale, Scale Development

INTRODUCTION

Health literacy (HL) is defined as a set of concepts that include many health-related decisions and practices, such as knowing how to access health services, knowing how to sign health-related information forms, making decisions on any topic of health, and correct usage of the medications (Yılmaz & Tiryaki,2016; Akbal & Gökler,2020; Özkan et al.,2020; Balçık et al. ,2014). The concept of HL was used for the first time by Simond SK in the year 1974 and in the year 1998 World Health Organization (WHO) defined HL as "the ability to access, understand and use health information for the protection and continuity of health" (WHO, 1998). However, this concept, which has not been emphasized for many years, has gained particular importance in recent years (Bakan&Yıldız,2019). Linking to health literacy, we stress that Covid-19 health literacy is a very important concept for health professionals, especially medical school students. These students, who will guide the medicine of the future, are an important group in achieving the goals set in the "Health Promotion in Line with the 2030 Sustainable Development Goals" Shanghai Declaration. First, it is necessary to develop and activate HL at the level of health students and physicians. For "to use to enable people to control their own health and determinants using digital technology (telemedicine)", which is predicted as the approach of the future, the fact that all segments of the society, especially physicians, have detailed information on this issue will enable these goals to be achieved (Park, 2016; Üstgörül et al. 2020).

Especially in low- and middle-income countries while patients use preventive health services less, they tend to use medical services more. Therefore, they understand their treatment less and their adaptation to treatment is at a lower level. For Covid-19 HL awareness in patients, it is important that healthcare professionals with high Covid-19 HL primarily serve. If medical students are aware of the concept of Covid-19 HL, the information they receive during their education; it will be ensured that they can recognize their own diseases, identify their

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findings, and use them in the context of making decisions that they think are good for them.

This perspective will enable them to convey Covid-19 HL awareness to the patients they serve. Low or poor HL is an important topic not only for patients, but also for health professionals, health institution administrators, and even politicians. Because it is necessary for the doctor to develop a special communication and approach strategy for individuals with low Covid-19 HL. In addition, Covid-19 HL is of great importance in reorganizing and restructuring health services due to the increasing use of health services and health costs carries (Teleş & Kaya, 2018; Alpuche-Aranda & Lazcano-Ponce, 20207).

Covid-19 HL and health literacy are closely related and become even more important especially during the pandemic. How challenging the information pollution in the pandemic is for healthcare professionals and patients has once again shown itself in the control of the epidemic and vaccination studies. (Puri et al., 2020.) Therefore, beside HL, Covid-19 HL is also very important for the prevention of diseases (Castro-Sánchez et al., 2016). Individuals should not occupy health centres with less important medical situations and should comply with the rules (such as quarantine) taken by the health system in epidemic situations. On the other hand, there were also delays in applying to the hospital due to the fear of the pandemic or misinterpretation of their personal health conditions. (McCaffery et al., 2020). In this context, urgent decisions need to be taken and implemented by health managers. It is thought that Covid-19 HL, the importance of which cannot be denied, will undoubtedly be effective in the management of this global epidemic and in preventing its spread (Nguyen et al., 2021).

The learning models used in medical education today are more about what the correct and effective learning methods are and how they can be taught to students, rather than teaching. Students who learn to learn, could question, interpret, participate, and know how to share are accepted as active learning (Turan Özdemir, 2003). Measuring how medical students will interpret accurate information about COVID-19 under the guidance of HL will enable medical students to be encouraged to learn correctly. Therefore, we aimed to develop the COVID-19 Health Literacy (HL) scale in this study. We think that this scale will be important both in terms of making appropriate improvements in educational conditions by using it in the individual HL measurement of students who receive education in pandemic risky conditions in the medical faculty, and in determining the perceptions of COVID-19 HL in the protracted pandemic process of medical students who will be the future managers / leaders who will work in health institutions and organizations.

METHODS

The purpose of this study was to develop a scale to assess medical students' COVID-19 HL. 628 medical students from different universities in Turkey were the sample of the study. Surveys were emailed to participants in each sample. The email included a cover letter explaining the purpose of the study, instructions, and a link for the online survey's completion. After the content, language, and structure of the scale were validated the reliability and construct assessment were analysed as below.

Measurement Strategy and Item Development

An inductive approach was used to develop an initial pool of items (Hinkin, 1998) based on the qualitative study. For the preparation of the scale items, the validated scales related to HL. Since the target group is thought to have more advanced skills to critically analyze health-related information and enable it to be used in health decisions. 26 items were created by scanning articles related to COVID-19 and HL.

Among the scale items, current data related to COVID-19, diagnosis, treatment and prevention methods, medical and social knowledge adequacy, and the source of the information regarding the developments on the subject were included.

Pilot Study: Item Reduction

Before the pilot study, a language expert was consulted, and 70 medical students were interviewed face-to-face. After the pilot study, a number of questions were corrected by taking the opinion of three experts, one of whom was a language expert, and 6 items were removed.

Study Design and Settings

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Of the medical faculty students studying at seven universities with a total of 2000 students, a simple randomly selected sample study was conducted with the participation of medical students from 1, May to 1, July 2021 by using online survey. Medical students from seven medical faculties across Turkey were included in the study. Universities were selected as comparable in terms of key features such as size, geographic location. Surveys were emailed to 350 potential participants for each sample. The email included a cover letter explaining the purpose of the study, instructions, and a link for the online survey's completion.

Participants

Six hundred and twenty-eight medical students participated in the study. Surveys were emailed to 350 participants for each sample. Sample 1 yielded 302 responses for conducting to EFA and sample 2 yielded 326 responses for conducting to CFA from different students studying in different universities.

Data Collection Procedure

Medical students from different universities were invited to participate in the study by two researchers (SAC, SSA). An online survey link send to medical students via email, SMS, WhatsApp. We didn't interview with them due to the COVID-19 pandemic. Those who did not agree to participate in the study were not included the study. A 5-point Likert scale (1 = "strongly disagree", 2 = "disagree", 3 = "neither disagree or agree", 4 = "agree", 5 = "strongly agree") was used. After the expert panel suggested removing 6 items that are not closely related with COVID- 19 or have the same meaning with other(s), finally 20 items were left to collect data. The survey took about 7-10 minutes to complete the questions. All questions were mandatory; thus, there was not any missing data in our study. The collected data was analyzed by IBM SPSS Statistics (version 22, IBM Corporation, New York, NY), and Structural Equation Modelling (SEM) using AMOS 23 application by the researchers.

Data Analysis and Content Validation

The distribution of the studied variables was explored using descriptive analysis. Content validity was conducted to examine the extent to which the concepts are represented by the items in the questionnaire (Guyatt et al. 1993). Principal component analysis (PCA) to examine the structure of the COVID-19 HL scale that we tried to develop in our study. We also used the Kaiser-Meyer-Olkin (KMO) Sampling Adequacy Criterion to determine the suitability of the data for component analysis. The originally established criteria KMO measure of sample adequacy. The Cronbach's Alpha test was used to assess the internal consistency, with satisfactory reliability corresponding to a value ≥0.70. *:* The percentages of respondents who scored the lowest score or the highest score were calculated. The minimal floor and ceiling effects (<15%) were recommended (McHorney, C. A., & Tarlov, A. R. 1995; Terwee, et al. 2007). The significance level was set at $p < 0.05$.

Ethical Consideration

The study protocol was approved by the Institutional Ethical Review Committee of Manisa Celal Bayar University, Turkey (No. E--050.01.04-69556). The online consent form was obtained from the participations before answering the questions. The Helsinky protocol, which was revised in 2013, was followed in the study.

RESULTS

Participation in both groups was quite high. In the 1st sample, the survey was sent to 350 people, 86% (n=302) answered, in the 2nd sample it was 93%(n=326).

Participant Characteristics

The mean age of the participants was 22.39 years (18-40 years). 199 students (65.9%; mean ± SD= 20.4±1.18) are between 18 and 22, 103 students are between 23 and 40 (34.1%; Mean ± SD=26.6±4.65) Most of the respondents (72.2%) were female. The largest group (44.4%) was from 1st-year students. Most of the participants (59.9%) have heard about HL while (40.7%) have no idea about HL. While 49.0 % of participants stated that they have heard about COVID-19 HL from the internet, social media, school, and environment, the rest (51.0 %) stated that they have not heard.

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Psychometric Properties of COVID-19 HL and Construct Assessment (EFA)

To determine the factor structure of the scale, data was collected from 302 university medical students. After the content, language, and structure of the scale were validated, the scale items were examined by using exploratory factor analysis (EFA). The item to response ratio for the current EFA was approximately fifteen times the number of items on the scale 302/20≈15.1), suggesting adequacy of the sample for carrying out EFA.

The Bartlett's test of sphericity to determine the factorability of the data, and the KMO test to measure the sampling relevance were performed (Lau & Yuen, 2014). The KMO measure of sampling adequacy yielded a value of .963, indicating good sampling relevance, and the test of Sphericity was significant (χ2(190) = 6341,698, p =0.000), indicating the data was suitable for structure detection. Kaiser (1974) recommends that the Eigen values below 1.0 are indicative of potentially unstable factors. By applying the Kaiser criteria, 72.26% of the total variance was explained by two factors (Table 1).

Factors correlate and Principal Component Analysis were conducted. All the factor loading values are greater than .30 and any of the items were not loading in two factors, therefore, no item was removed from the scale. Through this process, two factors and 20 items were extracted. Table 2 presents descriptive statistics for each item and Table 3 presents the items and the factors which are in the acceptable range for factor loading.

Dimensionality and Construct Validity (CFA)

Factor structure was examined though confirmatory factor analysis (CFA). Sample 2 yielded 326 responses from different students studying in different universities in Turkey. The mean age was 24.42 years between 18-47 years. Most of the respondents (60.9%) were female. The largest group (38.4%) was from grade 1 students. Most of the participants (62.2%) have heard about Covid-19 HL while (37.8%) have no idea about Covid-19 HL. Just over 47 % of students stated they obtained information related to Covid-19 from the internet, social media, school, and environment. Most of the students (83.4%) indicated they read health care information sheet/paper/brochure by themselves; 52.8% of participants stated they fully understood materials related to COVID; and 42.9% stated they required further explanation by health care providers.

Cronbach's alpha score of .7 was obtained. As well, Cronbach's alpha of .929 for the Follow dimension, .936 for the Search dimension, and .941 for the Covid-19 HL scale was reported suggesting the reliability of the scale is quite high.

Confirmatory factor analysis (CFA) was conducted with initial results suggesting a good fit for the two-factor model. Our inspection of modification indexes, standardized residuals, and factor loadings indicates 20 items were loading on two factors that confirmed scale structures as seen in EFA analysis. Therefore, we did not need to delete items when developing and validating a new measure, items that have low loadings and load on more than one factor (e.g., Hinkin, 1998). Accordingly, we obtained a 20-item two-factor model, which demonstrated a good fit (CMIN (χ^2) is 2.58; p 0.000; RMSEA 0.069; CFI 0.937; IFI 0.938; TLI 0.928; GFI 0.912) and determined that the standardized predictive values were positive and the values of goodness of fit were within acceptable ranges (Schermelleh-Engel et al., 2003). Both factors and all items are statically significant (p<.05) which confirms factors structure (Table 4).

DISCUSSION

Although all participants in our study were medical school students, awareness, comprehension, and understanding of COVID-19 was below what we expected. This may be due to the rapid spread of misinformation pertaining to the pandemic (Lockyer et al. 2021; Vijjali, R., Potluri, P., Kumar, S., & Teki). Thus, there is a need for medical schools to ensure their students are kept up to date with current health situations, as these students may play a larger role in caring for patients diagnosed with these diseases. Medical school curriculum should be flexible to accommodate for the integration of pandemic, epidemics, or endemic. This will allow for integration of real world, current events into clinical case studies, lecture content, and clinical placements, resulting in a richer teaching and learning environment.

Assessment of health literacy is key to understanding students' perception of COVID 19. No

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statistically significant difference was found between the students' age, gender, class, educational background, social security and income levels, and HL level in general and in its sub-dimensions (Soysal & Obuz, 2020). This may be due to the sudden onset of the pandemic which appeared to impact all individuals. Thus, a uniform curriculum should be created, implemented, and revised on an ongoing basis. The findings also suggest the Health Literacy scale demonstrated acceptable reliability and validity scores and can be adapted across several healthcare sectors.

LIMITATION AND CONCLUSION

The study data was collected by online survey due to pandemic conditions, and the fact that no face-to-face survey was applied is the limitation of the study. In addition, the number of participants is limited due to the low number of people that can be reached.

In conclusion, while the current study's findings suggested a feasible structure for the scale, more research is clearly needed to confirm these findings. In this regard, investigations undertaken in other sectors or nations will be particularly valuable.

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Table 1. Total Variance Explained

	Initial Eigen Values			Extraction Sums of Squared Loadings		
Component	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
1	12,865	64,323	64,323	12,865	64,323	64,323
2	1,588	7,941	72,264	1,588	7,941	72,264
3	,796	3,979	76,244			
4	,674	3,372	79,615			
5	,562	2,808	82,423			
6	,514	2,568	84,991			
7	,355	1,775	86,765			
8	,345	1,726	88,491			
9	,306	1,532	90,024			
10	,301	1,507	91,531			
11	,278	1,388	92,919			
12	,241	1,207	94,125			
13	,200	,999	95,125			
14	,189	,943	96,068			
15	,164	,822	96,890			
16	,151	,755	97,644			
17	,136	,682	98,326			
18	,130	,651	98,977			
19	,111	,557	99,534			
20	,093	,466	100,000			

Extraction Method: Principal Component Analysis.

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Table 2. Descriptive statistics for each item

Items on Health Literacy COVID-19 Scale																					
		S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17	S18	S19	S20
N	Valid	326	326	326	326	326	326	326	326	326	326	326	326	326	326	326	326	326	326	326	326
	Missing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean		3,39	3,13	2,90	3,21	3,19	3,31	3,25	3,36	3,27	3,09	3,27	3,31	3,03	2,70	2,75	2,54	3,02	2,85	3,02	2,97
Standard Deviation		1,069	1,190	1,131	1,114	1,120	1,097	1,143	1,147	1,154	1,208	1,164	1,145	1,095	1,082	1,167	1,175	1,173	1,244	1,174	1,172

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Table 3. The Results of EFA

Component Matrix[a]				
		Statements	Component	
No	ID*		1	2
1	S1	I have enough information about COVID-19.	,700	
2	S2	I closely follow social media about COVID-19.	,759	
3	S3	I constantly follow global COVID-19 case numbers.	,794	
4	S4	I closely follow new developments regarding COVID-19.	,857	
5	S5	I closely follow new developments regarding the treatment of COVID-19.	,858	
6	S6	I closely follow new developments regarding COVID-19 measures.	,893	
7	S7	I closely follow the developments regarding the COVID-19 vaccine results.	,844	
8	S8	I closely follow the ways/methods of protection from COVID-19	,868	
9	S9	I closely follow new developments related to transmission routes such as COVID-19.	,870	
10	S10	I constantly monitor the number of COVID-19 cases in the province I live in.	,804	
11	S11	I follow the COVID-19 statements of the Ministry of Health	,860	
12	S12	I closely follow new developments regarding COVID-19 symptoms.	,904	
13	S13	I usually follow the World Health Organization's statements about COVID-19.	,839	
14	S14	I constantly research scientific studies about COVID-19.	,745	
15	S15	I am constantly researching how COVID-19 will end.		,775
16	S16	I research the epidemiology and treatment of COVID-19.		,764
17	S17	I constantly research whether the measures taken regarding COVID-19 are sufficient or useful.		,784

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18	S18	I am constantly researching when the COVID-19 pandemic will end.		,745
19	S19	I constantly research how the COVID-19 pandemic affects/will affect social life.		,779
20	S20	I am constantly researching how the COVID-19 pandemic has/will affect family life/order.		,744

Extraction Method: Principal Component Analysis.
a. 2 components extracted.
*It denotes the position of statement in the COVID-19 HL Scale
Capturing the essence of the factors, they were named as below:
Factor 1= Follow COVID-19 HL with 14 items
Factor 2= Search COVID-19 HL with 6 items

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Table 4: Default model

			Estimate	S.E.	C.R.	P	Label
F2	<---	COVID 19 Health_Literacy	1,000				
F1	<---	COVID 19 Health_Literacy	,544	,064	8,518	***	
S14	<---	F1	1,000				
S13	<---	F1	1,221	,070	17,406	***	
S12	<---	F1	1,438	,094	15,350	***	
S11	<---	F1	1,374	,095	14,531	***	
S10	<---	F1	1,309	,097	13,465	***	
S9	<---	F1	1,377	,094	14,679	***	
S8	<---	F1	1,368	,093	14,678	***	
S7	<---	F1	1,328	,093	14,331	***	
S6	<---	F1	1,372	,090	15,290	***	
S5	<---	F1	1,337	,091	14,688	***	
S4	<---	F1	1,348	,091	14,859	***	
S3	<---	F1	1,209	,091	13,299	***	
S2	<---	F1	1,213	,095	12,733	***	
S1	<---	F1	,853	,084	10,142	***	
S20	<---	F2	1,000				
S19	<---	F2	1,051	,040	26,311	***	
S18	<---	F2	1,122	,060	18,692	***	
S17	<---	F2	1,079	,056	19,270	***	
S16	<---	F2	,845	,062	13,646	***	

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	Estimate	S.E.	C.R.	P	Label
S15 <--- F2	1,027	,057	18,004	***	

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