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Validity and reliability of the Turkish version of the HLS-EU-Q6 questionnaire

Müjdat YEŞİLDAL[1*]

Abstract

Background Health literacy plays an important role in the effectiveness of health services by affecting individuals' ability to access, understand, and use health information. Many people in Turkey have limited health literacy. This study aimed to determine the psychometric validity and reliability of the Turkish version of the HLS-EU-Q6.

Methods This psychometric study used a cross-sectional design and was conducted with 475 Turkish adults between January and March 2024. The adaptation followed internationally accepted guidelines, including translation, synthesis, back-translation, expert panel review, piloting, and finalization. Content validity was assessed using the Content Validity Index (CVI). The sample was randomly divided into two independent subsamples for exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). Reliability analyses included Cronbach's alpha, McDonald's omega, composite reliability (CR), average variance extracted (AVE), and item discrimination indices.

Results In the EFA group, the mean age was 28.89 ± 9.44 years, and 63.4% were female. The CFA group's mean age was 28.76 ± 10.05 years, and 67.3% were female. According to the TR-HLS-EU-Q6, problematic health literacy was identified in 77.5% of participants in the EFA group and 73.8% in the CFA group. Exploratory factor analysis supported a unidimensional factor structure with loadings ranging from 0.664 to 0.853. Confirmatory factor analysis confirmed acceptable model fit ($\chi^2/df = 2.61$, RMSEA = 0.06, SRMR = 0.06, TLI = 0.92, GFI = 0.96). Cronbach's alpha and McDonald's omega coefficients were 0.82 and 0.84, respectively, demonstrating high internal consistency. The AVE was 0.59, supporting convergent validity. Discriminant analyses showed significant item discrimination between high- and low-scoring groups ($p < 0.001$).

Conclusions The Turkish version of HLS-EU-Q6 consistently showed acceptable psychometric reliability and validity characteristics.

Keywords HLS-EU-Q, Health literacy, Psychometric, Validity, Reliability, Turkish

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Background

Health literacy is a critical concept in public health and individual health management that refers to the ability of individuals to access, understand, evaluate, and use health-related information to make healthy decisions [1]. The level of health literacy has a direct impact on individuals' capacity to protect their health, prevent diseases, and maintain a healthy lifestyle, and low levels of health literacy are associated with adverse outcomes such as incorrect treatment decisions, inadequate disease management, and unnecessary use of health services [2, 3]. Therefore, measuring the population's health literacy level is critical for improving public health and increasing the effectiveness of health services.

Studies conducted in Turkey show that the health literacy level of society is generally low, and this situation negatively affects the effective use of health services [4–7]. Especially those living in rural areas, the elderly, individuals with low education levels, and those living with chronic diseases are defined as risk groups in terms of health literacy [8, 9]. In addition, low health literacy negatively affects individuals' access to health services and their ability to recognize disease symptoms early and evaluate health information [4, 10]. Such findings make the necessity of Turkish adaptation of the HLS-EU-Q6 and the potential of this tool to respond to the community's health needs even more important.

The Health Literacy Survey Europe (HLS-EU) is a comprehensive tool developed to measure levels of health literacy across Europe [11]. This questionnaire was developed to measure the capacity of individuals to acquire, understand, evaluate, and use health information. It is widely used to determine the level of health literacy in societies. The HLS-EU-Q6, the short form of the HLS-EU questionnaire, is designed to assess health literacy more quickly and practically and has become an important measurement tool, especially for researchers and health professionals. The questionnaire includes questions assessing individuals' access to health-related information, how they understand it, and their interactions with health services [12, 13]. Adaptation studies conducted in different countries have shown that the HLS-EU-Q6 is a reliable and valid instrument [14–17].

When the literature was examined, it was determined that the HLS-EU-Q47, HLS-EU-Q16, and HLS-EU-Q12 versions were adapted into Turkish [18–20]. However, the shorter length of the HLS-EU-Q6 is important for ease of use. The Turkish adaptation of the HLS-EU-Q6 will provide a reliable tool for health service providers, researchers, and policymakers to measure health literacy, enabling them to assess the population's access to health-related information and their ability to understand and use information. Shortening scales can be advantageous in research involving larger populations, as shorter scales are more likely to be completed by participants, leading to better compliance [21]. This adaptation may facilitate the implementation of large-scale assessments and contribute to the development of evidence-based health promotion strategies.

Methods

Aim

This study aims to determine the psychometric validity and reliability of the Turkish version of HLS-EU-Q6.

Specifically, this study sought to answer the following research questions:

- Is the Turkish version of the HLS-EU-Q6 a valid instrument for assessing health literacy among Turkish adults?
- Does the Turkish version of the HLS-EU-Q6 demonstrate satisfactory internal consistency and item discrimination?
- What are the psychometric properties, including content validity, construct validity, and reliability, of the adapted Turkish version of the scale?

Study Design and Participants

This psychometric study used a cross-sectional design. The data were collected in Konya province, located in the Central Anatolia region of Turkey. In validity and reliability studies, the sample size should be 5 to 10 times the number of items, and according to the sample size recommended for psychometric validation studies, it should consist of 300 participants. Accordingly, the original scale consists of 6 items, and at least 300 samples should be reached [22–25]. Data collected from 475 people were used within the research scope.

The sample was divided into two groups for exploratory and confirmatory factor analyses. Each participant was assigned a random number between 0 and 1 with the "Uniform Random Number" command using SPSS software, and the participants were randomly distributed into two groups of approximately equal size, according to the median value of these numbers. Those with a random number value below the median were assigned to the EFA group, while those with a random number value above the median were assigned to the CFA group. Thus, EFA and CFA analyses were conducted on independent data sets. This approach was preferred to reduce the effect of data crossover between the analyses and establish the scale's construct validity more solidly.

Instruments

Personal information form

It consists of six questions about the demographic characteristics of the participants, including age, gender,

educational status, income, marital status, and the number of visits to health institutions in the last year.

HLS-EU-Q6

The HLS-EU questionnaire consists of 4 versions, HLS-EU-Q86, HLS-EU-Q47, HLS-EU-Q16, and HLS-EU-Q6, within the European Health Literacy Project scope between 2009 and 2012 [26]. The HLS-EU-Q6 was created using the six items from the HLS-EU test. The HLS-EU-Q6 is a short-form version of the European Health Literacy Survey Questionnaire, comprising six items selected from the original 47-item scale (HLS-EU-Q47). Each item is rated on a 4-point Likert scale reflecting the perceived difficulty: Very difficult = 1, Fairly difficult = 2, Fairly easy = 3, Very easy = 4. Responses marked as "Don't know" or "Refused" were treated as missing data. The scale score was calculated as the mean of the valid responses, resulting in a total score ranging from 1 to 4. Participants were included in the analysis only if they had completed at least five out of six items [27]. The scores obtained were evaluated as follows. All participants received scores ranging from 1 to 4. The scores were inadequate (HLS-EU-Q6 score ≤ 2), problematic (HLS-EU-Q6 score > 2 and ≤ 3), and adequate (HLS-EU-Q6 score > 3).

Translation and cultural adaptation

The translation process began after obtaining permission from the corresponding author who developed the original scale. The adaptation followed established guidelines for cross-cultural adaptation of measurement instruments [28, 29]. It consisted of six sequential stages: translation, synthesis of translations, back-translation, expert panel review, piloting and cognitive debriefing, and finalization.

- In the first stage, three native Turkish speakers fluent in English independently translated the original English version into Turkish. These translators included one public health specialist, one independent professional translator, and one psychological counselor with a Ph.D.
- In the second stage, the researcher and an external bilingual expert synthesized the three translations into a preliminary version. During this synthesis process, discrepancies were systematically identified and resolved by consensus. Common issues included inconsistent terminology (e.g., different translations of "mental well-being"), ambiguous wording, and culturally inappropriate expressions. These were corrected to ensure semantic and conceptual equivalence with the original scale.
- In the third stage, the synthesized Turkish version was independently back-translated into English by three native English-speaking public health experts who were blinded to the original questionnaire. This procedure aimed to verify the fidelity of the translation.
- In the fourth stage, an expert panel of 10 professionals—comprising public health academics ($n = 4$), health education specialists ($n = 3$), and experienced bilingual clinicians ($n = 3$)- evaluated the original English version, the Turkish translation, and the back-translation. The experts were purposively selected for their experience in health literacy, scale development, and cross-cultural adaptation. They independently evaluated each item using a 3-point scale ("Appropriate," "Appropriate but requires revision," and "Should be removed"), and established guidelines calculated content validity metrics.
- In the fifth stage, the pre-final Turkish version was pilot-tested with a convenience sample of 45 health science graduate students to assess the items' clarity, cultural relevance, and comprehensibility. Participants provided feedback on any unclear or confusing wording. Based on their suggestions, minor adjustments were made to finalize the Turkish version of the HLS-EU-Q6.

Data collection

The study data were collected online via Google Forms between January and March 2024. After obtaining ethics committee approval, the survey link was distributed to potential participants using a combination of targeted approaches. Invitations were shared in moderated social media groups (e.g., Facebook and WhatsApp) specifically aimed at adults residing in Konya, Turkey, and through local community networks, neighborhood associations, and publicly accessible online platforms. Individuals were eligible to participate if they were 18 or older, resided in Turkey, and could read and understand Turkish. Participation was voluntary, and respondents provided informed consent before beginning the survey. No incentives were offered. Approximately 1,200 individuals viewed the survey invitation, and 475 provided complete responses. It took an average of 6 min for participants to complete one questionnaire. The questionnaire included an informed consent form, a personal information form, and TR-HLS-EU-Q6. However, regarding data security, Google's infrastructure, which is compliant with the General Data Protection Regulation and the personal data protection law was used, and no IP address, identity information, or location data was collected.

Data analysis

The collected data were analyzed using the Statistical Package for Social Sciences (SPSS) version 29.0 and Analysis of Moment Structures (AMOS) version 26.0.

The conformity of the data to a normal distribution was assessed based on skewness and kurtosis coefficients, which ranged between −1 and +1, indicating acceptable normality [29, 30]. Participants' sociodemographic characteristics were summarized using descriptive statistics (frequency, percentage, mean, and standard deviation).

Based on expert evaluations, content validity was assessed by calculating Content Validity Index (CVI) values for each item and overall scale. For construct validity, the total sample was randomly divided into two independent subsamples: the first subsample ($n = 227$) was used for exploratory factor analysis (EFA), and the second subsample ($n = 248$) was used for confirmatory factor analysis (CFA). Principal component analysis with varimax rotation was performed in EFA to identify the underlying factor structure.

Table 1 Descriptive statistics of participant characteristics of EFA and CFA groups ($N = 475$)

Characteristics	Group EFA ($n = 227$, %47.8)	Group CFA ($n = 248$, %52.2)
Age		
≤ 22	74 (32.6)	89 (35.9)
23–29	71 (31.3)	76 (30.6)
30 ≥	82 (36.1)	83 (33.5)
Mean (SD)	28.89 (9.44)	28.76 (10.05)
Sex		
Male	83 (36.6)	81 (32.7)
Female	144 (65.6)	167 (67.3)
Marital Status		
Married	78 (34.4)	85 (34.3)
Single	149 (65.6)	163 (65.7)
Education		
High school and below	48 (20.3)	62 (25.0)
Associate degree	58 (25.6)	70 (28.2)
Bachelor degree	65 (28.6)	66 (26.6)
Postgraduate degree	58 (25.6)	50 (20.2)
Monthly income (₺)		
≤ 20.000	81 (35.7)	85 (34.3)
20.001–40.000	77 (33.9)	84 (33.9)
40,001 ≥	69 (30.4)	79 (31.9)
Number of visits		
≤ 2	56 (24.7)	72 (29.0)
3–7	101 (44.5)	101 (40.7)
8 ≥	70 (30.8)	75 (30.2)
Mean (SD)	6.84 (7.62)	7.70 (9.56)
TR-HLS-EU-Q6		
Inadequate	3 (1.3)	3 (1.3)
Problematic	176 (77.5)	183 (73.7)
Sufficient	48 (21.1)	62 (25.0)
Mean index score (SD)	2.82 (0.38)	2.86 (0.37)
Range	1.83–3.67	1.83–3.67

CFA was conducted to test the hypothesized unidimensional model and to assess model fit. The following fit indices were calculated: chi-square to degrees of freedom ratio (χ^2/df), Root Mean Square Error of Approximation (RMSEA), Standardized Root Mean Square Residual (SRMR), Tucker Lewis Index (TLI), and Goodness of Fit Index (GFI). Acceptable thresholds for model fit were defined as $\chi^2/df < 3$, RMSEA and SRMR < 0.08, and TLI and GFI > 0.90 [24, 31, 32].

Reliability analyses included calculating Cronbach's alpha and McDonald's omega coefficients to assess internal consistency. In addition, composite reliability (CR) and average variance extracted (AVE) were computed to evaluate internal consistency and convergent validity. Item discrimination was tested by comparing the upper 27% and lower 27% scoring groups using independent samples t-tests. The statistical significance level was set at $p < 0.05$. The statistical significance level was set at 0.05.

Ethical Considerations.

The Principles of the Declaration of Helsinki were followed when conducting the study. Before the study, approval was received from the Selçuk University Faculty of Health Sciences Non-Interventional Research Ethics Committee (Date: 29.11.2023, Decision No: 2023/1213). In addition, all participants read the consent form before filling out the survey and completed the study after checking the "I agree to participate in the research" box.

Results

Participants' characteristics

Table 1 presents the demographic characteristics of the participants assigned to the exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) subgroups. Within the scope of the study, the sample was randomly divided into two groups: 227 participants (47.8%) in the EFA group and 248 participants (52.2%) in the CFA group. The proportion of female participants was relatively similar between groups (EFA: 63.4%; CFA: 67.3%). The marital status distribution indicated that approximately two-thirds of participants were single (EFA: 65.6%; CFA: 65.7%). Regarding educational attainment, most participants held at least a bachelor's degree (EFA: 54.2%; CFA: 46.8%), with a notable proportion also reporting postgraduate education (EFA: 25.6%; CFA: 20.2%). Monthly income was comparable across subgroups, with about one-third earning ₺20,000 or less monthly. The mean number of visits to health institutions over the past year was 6.84 (SD = 7.62) in the EFA group and 7.70 (SD = 9.56) in the CFA group. Regarding health literacy levels assessed by the TR-HLS-EU-Q6, most participants were categorized as having problematic health literacy (EFA: 77.5%; CFA: 73.8%), while a smaller proportion demonstrated sufficient health literacy (EFA: 21.1%; CFA: 25.0%). The mean index scores were similar

Table 2 Distributional statistics for individual TR-HLS-EU-Q6 items ($N = 475$)

Items, *n* (%)	Very difficult	Difficult	Easy	Very easy
1. Judge when you may need to get a second opinion from another doctor	0 (0)	84 (17.7)	326 (68.6)	65 (13.7)
2. Use information the doctor gives you to make decisions about your illness	0 (0)	18 (3.8)	367 (77.3)	90 (18.9)
3. Find information on how to manage mental health problems like stress or depression	23 (4.8)	139 (29.3)	248 (52.2)	65 (13.7)
4. Judge if the information on health risks in the media is reliable	98 (20.6)	230 (48.4)	122 (25.7)	25 (5.3)
5. Find out about activities that are good for your mental well-being	0 (0)	69 (14.5)	296 (62.3)	110 (23.2)
6. Understand information in the media on how to get healthier	8 (1.7)	98 (20.6)	276 (58.1)	93 (19.6)

Items were scored as follows: Very difficult = 1, Fairly difficult = 2, Fairly easy = 3, Very easy = 4.

Table 3 Factor loadings of TR-HLS-EU-Q6 (PCA, $N = 227$)

Items	Factor load
1. Judge when you may need to get a second opinion from another doctor	0.74
2. Use information the doctor gives you to make decisions about your illness	0.64
3. Find information on how to manage mental health problems like stress or depression	0.71
4. Judge if the information on health risks in the media is reliable	0.66
5. Find out about activities that are good for your mental well-being	0.75
6. Understand information in the media on how to get healthier	0.84
Eigenvalue	4.20
Explained variance (%)	52.5

between groups (EFA: M = 2.82, SD = 0.38; CFA: M = 2.86, SD = 0.37), with observed scores ranging from 1.83 to 3.67. These findings suggest that the EFA and CFA samples were largely comparable in their demographic profiles, supporting the methodological approach of splitting the sample for psychometric validation.

Item distributional statistics

Table 2 summarizes the distribution of responses to the items in the TR-HLS-EU-Q6 questionnaire. Regarding "getting a second opinion from another doctor," 68.6% of the participants found it "easy," while 17.7% found it "difficult." In the item "Making decisions about the disease using the information provided by the doctor," 77.3% of the participants found it "easy," and 18.9% found it "very easy." While 52.2% found it "easy" to find information about mental health problems, 29.3% found it "difficult." Assessing the credibility of health risks in the media was the most challenging item; 48.4% found it "difficult," and 20.6% found it "very difficult." "Finding activities for mental well-being" was found 'easy' by 62.3%, while 58.1% found it 'easy' to understand health promotion information. In general, evaluating media sources was more difficult, while using physician information and finding activities for mental well-being were more accessible.

Validity analysis

Table 3 presents the factor loadings of the TR-HLS-EU-Q6 and assesses the relationship between health literacy and the questionnaire items. The content validity of the TR-HLS-EU-Q6 was evaluated based on the expert panel review. The Content Validity Index (CVI) was calculated for each item and the overall scale using the method proposed by Lawshe (1975) [28]. The overall CVI was 0.92, with item-level CVIs ranging between 0.88 and 0.95. These values exceeded the commonly accepted threshold of 0.80, indicating satisfactory content validity.

Before exploratory factor analysis, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity were performed to determine the suitability of the data for factor analysis. The KMO coefficient was 0.78, which is considered acceptable, and Bartlett's test was significant (χ^2=330.33; df = 15; $p < 0.001$), confirming that the correlation matrix was appropriate for factor extraction.

Exploratory factor analysis was conducted using principal component analysis with varimax rotation to examine the underlying factor structure of the TR-HLS-EU-Q6. The results revealed a unidimensional structure with factor loadings ranging from 0.664 to 0.853, indicating that all items contributed meaningfully to the latent construct. Specifically, the item assessing understanding health information in the media demonstrated the highest factor loading (0.853), suggesting a particularly strong association with overall health literacy. Other items, including evaluating doctors' recommendations (0.768), learning about activities for mental well-being (0.768), finding information to manage mental health problems (0.722), assessing the credibility of health risks in media (0.684), and using information to make health-related decisions (0.664), also showed substantial loadings. These findings support the scale's construct validity and confirm the appropriateness of a single-factor solution.

Table 4 presents the standardized factor loadings, composite reliability (CR), and average variance extracted (AVE) for each item of the TR-HLS-EU-Q6 and the overall model fit indices obtained from confirmatory factor analysis. The standardized factor loadings ranged from 0.70 to 0.84, exceeding the recommended threshold of 0.50, which indicates adequate item contributions to the

Table 4 Confirmatory factor analysis results: factor loadings, CR, AVE, and fit indices ($N = 248$)

Item number	Estimate		CR		AVE
1	0.78		0.89		0.59
2	0.70				
3	0.76				
4	0.70				
5	0.80				
6	0.84				
Fit indices	χ^2/df	RMSEA	SRMR	TLI	GFI
Reference value	< 3	< 0.08	< 0.08	> 0.90	> 0.90
Model	2.61	0.06	0.06	0.92	0.96

latent construct. The composite reliability was calculated as 0.89, demonstrating excellent internal consistency, while the AVE value of 0.59 surpassed the commonly accepted cut-off of 0.50, supporting convergent validity. Regarding model fit, the indices indicated a satisfactory fit to the data: χ^2/df = 2.61, RMSEA = 0.06, SRMR = 0.06, TLI = 0.92, and GFI = 0.96. All values met or exceeded reference criteria, confirming the adequacy of the unidimensional model structure [24, 31, 32]. These results demonstrate that the TR-HLS-EU-Q6 has robust psychometric properties regarding factor structure, internal consistency, and convergent validity.

Reliability analysis

Discriminant analysis was conducted to test the discrimination of the items with the highest (27%) and lowest (27%) scores. Accordingly, the student t-test compared the lower and upper cut-off groups. For each mean item score, there was a significant difference between the low-scoring group ($n = 125$) and the high-scoring group ($n = 125$) ($p < 0.001$). Cronbach's alpha coefficient for the TR-HLS-EU-Q6 was 0.82, and McDonald's omega coefficient was 0.84. Based on these values, the scale demonstrates high internal consistency and can be considered highly reliable [33].

Discussion

This study evaluated the validity and reliability of the new version of TR-HLS-EU-Q6 based on the data obtained from participants living in Konya, Turkey. Adapting the scale to Turkish is of great importance in health literacy culture studies, as a valid and reliable instrument can be used to obtain national and international data to be compared. The study findings showed good internal consistency, content validity, and construct validity, indicating that the TR-HLS-EU-Q6 can measure the Turkish population's health literacy level. CFA results for the 6-item structure of the Turkish version supported a single-factor structure. In addition, each item contributed to its own expected scale, providing evidence for construct validity.

The content validity of the TR-HLS-EU-Q6 was assessed using CVI. According to the CVI results, the equivalence of the items in the Turkish form was evaluated. Content validity indices are expected to be above 0.80 [34]. In this study, the content validity index was at an acceptable level. Therefore, no item regarding content validity was removed from the scale. The construct validity of the scale was assessed using CFA. CFA is a type of structural equation modeling that reveals the relationships between items and factors [31]. Confirmatory factor analysis results showed that x^2/df, RMSEA, SRMR, TLI, and GFI values showed an acceptable fit [24, 31, 32]. Since the correction indices had no significant loading, no covariance was made between the items [34]. In addition, discriminant analyses showed that each item captured the difference between the highest and lowest scorers.

A study examining the French version of the HLS-EU-Q6 found that good construct validity was not achieved through Confirmatory Factor Analysis (CFA) and that scores on this version correlated poorly with other measures of health literacy and physician assessments. This study suggests that there are limitations in distinguishing between the health literacy levels of participants with average and high levels of health literacy [35]. Evaluating the Brazilian Portuguese version, the researchers found that the original classification criteria of the HLS-EU-Q6 should be modified to determine health literacy levels in Brazilian adults more accurately, and this finding highlights the importance of the effectiveness of cultural adaptation in different populations [15]. The HLS-EU-Q6, which was psychometrically evaluated in Brazil, showed a unidimensional structure with a high explained variance of 71.23% and was recognized as a reliable instrument for measuring health literacy for different population groups with good factor loadings and item discrimination [16]. A study of the Italian version confirmed that the Italian versions of the HLS-EU-Q16 and HLS-EU-Q6 questionnaires present a valid construct and are reliable and valid in the Italian general population. In this study, the internal consistency of the questionnaires was reported to be relatively high, and Cronbach's alpha coefficient was acceptable, indicating that the questionnaires can provide consistent results over time [27]. It

was determined that the fit model of the Bengali HLS-EU-Q6 form was low, and some items may differ in certain demographic groups [17].

Although the HLS-EU-Q6 is reliable in different settings, its validity may vary depending on the population and requires cultural adaptation to categorize health literacy levels accurately. Measuring health literacy through the HLS-EU-Q6 can help health professionals identify the real needs of healthcare users and redirect interventions accordingly.

These findings are consistent with previous studies conducted in Turkey, which have also reported generally low health literacy levels among adults. For example, a national survey indicated that approximately 64% of Turkish adults had either problematic or inadequate health literacy [10]. Similarly, Özdemir et al. (2010) [4] found low functional health literacy across different age and education groups. The proportion of participants in this study classified as having problematic health literacy was slightly higher than in earlier reports, which differences in sample characteristics and measurement tools may partly explain.

These findings have important implications for policymakers and public health practitioners. The availability of a short, validated Turkish health literacy instrument can facilitate large-scale screening and monitoring of health literacy levels across different population groups. Data derived from the TR-HLS-EU-Q6 can inform the design of targeted interventions, such as educational programs and communication strategies, to improve health literacy among vulnerable groups, including individuals with lower educational attainment, older adults, and those residing in rural areas.

This study has several limitations. It was conducted with a convenience sample predominantly composed of younger adults residing in an urban area, which may introduce selection bias and limit the generalizability of the findings to the broader Turkish population. Compared with national data from the Turkish Statistical Institute [36], the sample included a higher proportion of individuals with higher educational attainment and a younger mean age. Additionally, the cross-sectional design prevents assessment of the scale's stability over time, such as test-retest reliability. Although convergent validity was evaluated using Average Variance Extracted (AVE), correlations with other established health literacy measures were not performed, restricting the scope of the convergent validity evidence. Future research should replicate these findings in more diverse samples, including individuals from rural regions and older adults, and examine relationships with other validated instruments to confirm the scale's psychometric properties further.

Conclusion

As a result of the literature review, this is the first study to examine the psychometric properties of the HLS-EU-Q6 in the Turkish population. Our findings confirm that the short version of the HLS-EU, TR-HLS-EU-Q6, offers sufficient psychometric properties to measure the health literacy level of the Turkish population. Based on these results, it can be used to measure health literacy. Further research is needed to investigate its psychometric properties for widely validated applications.

Abbreviations

CFA	Confirmatory Factor Analysis
CVI	Content Validity Index
EFA	Exploratory Factor Analysis
GFI	Goodness of Fit Index
HLS-EU-Q	European Health Literacy Survey Questionnaire
KMO	Kaiser-Meyer-Olkin
PCA	Principal Component Analysis
RMSEA	Root-Mean-Square Error of Approximation
SRMR	Standardized Root Mean Square Residual
TLI	Tucker Lewis Index
TR-HLS-EU-Q6	Turkish European Health Literacy Survey Questionnaire

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Author's contributions

Writing first draft: MY; Data collection: MY; interpretation of data and statistical analysis: MY; Study concept, design, and critical revision: MY. The author read and approved the final article.

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Data availability

The data supporting this study's findings are available from the corresponding author upon reasonable request.

Declarations

Ethics approval

The ethics committee approval of the research was obtained from the Selçuk University Faculty of Health Sciences Non-Interventional Research Ethics Committee (2023/1213). Informed consent to participate was obtained from all participants.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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