

Do digital health information searches of individuals with chronic diseases affect health literacy and patient empowerment?

A path analysis

Şenay Şener, PhD, Seda Göger, PhD.

ABSTRACT

الأهداف: لفحص العلاقة بين اكتساب المعلومات الصحية وسلوكيات التأكيد لدى الأفراد المصابين بالأمراض المزمنة في البيئة الرقمية، ومحو الأمية الصحية وتمكين المريض، باستخدام نموذج المعادلة الهيكلية.

المنهجية: أجريت هذه الدراسة في العيادة الخارجية للطب الباطني في أحد المستشفيات العامة في تركيا خلال الفترة من فبراير ومايو 2023. أجرينا البحث، الذي كان له تصميم وصفي يبحث عن العلاقات، على 365 شخصًا. قمنا بحساب الإحصائيات الوصفية والارتباطات، واستخدام تحليل المسار لتقييم ملاءمة النموذج والتحقق في التأثيرات المباشرة وغير المباشرة.

النتائج: وفي الدراسة تبين أن متغيري «الويب 1.0 والحصول على المعلومات الصحية» و«التحقق الرقمي» أثرا على متغيرات الوصول إلى المعلومات وفهمها وتقييمها وتطبيقها على مستوى إحصائيا ومعنويا. بالإضافة إلى ذلك، تبين أن متغير الوصول إلى المعلومات له دلالة إحصائية على الهوية، وضبط النفس، واتخاذ القرار، والاعتراف والفهم. كان النموذج الذي تم اختباره مناسبًا وجيدًا وبإمكاننا أخذ اعتبار التأثيرات المباشرة لمتغيرات الدراسة.

الخلاصة: لكي يتمكن الأفراد المصابون بأمراض مزمنة من استخدام الإنترنت بشكل فعال، نوصي بزيادة مستويات المعرفة الإعلامية أو الرقمية لديهم من خلال تدريب خاص.

Objectives: To analyze the relationship between chronically ill patients' behaviors in acquiring and verifying health information from a digital environment with health literacy and patient empowerment using a structural equation modeling approach.

Methods: This study was carried out in a public hospital in Turkey between February and May 2023. The study consisted of 365 participants and used descriptive and correlation-based designs for statistical analyses. It also executed computations for descriptive statistics and correlations to carry out a path analysis to assess model fitness and to identify direct and indirect effects.

Results: This study identified that Web 1.0 and health information acquisition and digital verification

variables statistically and significantly affected access to information, understanding information, appraisal (valuing)/evaluation, and application/use variables. The study also found that access to information variables was statistically significant on identity/identicalness, self-control, decision-making, and recognition and comprehension. The tested model fit the data well and adequately explained the direct effects of the variables.

Conclusion: The study concluded by suggestively improving the chronically ill patients' media or digital literacy levels through special training to stimulate their internet use effectively.

Keywords: digital environment, health literacy, patient empowerment, path analysis

Saudi Med J 2024; Vol. 45 (6): 617-625
doi: 10.15537/smj.2024.45.6.20240158

From the Department of Health Care Services (Şener), Safranbolu State Hospital, Ministry of Health, Karabük, and from the Department of Health Care Services (Göger), Vocational School of Health Services, Sakarya University, Sakarya, Turkey.

Received 23rd February 2024. Accepted 15th May 2024.

Address correspondence and reprint request to: Dr. Seda Göger, Department of Health Care Services, Vocational School of Health Services, Sakarya University, Sakarya, Turkey.
E-mail: sedagoger@sakarya.edu.tr
ORCID ID: <https://orcid.org/0000-0003-2066-7147>

Nowadays, digital environments accessed for health information acquisition provide individuals with significant opportunities thanks to advancing technology and escalating internet access.^{1,2} In the digital world, health information search is actualize for a variety of causes, including information acquisition regarding health issues, coping with health-related

concerns, reducing uncertainty (disambiguation), making healthy decisions, and requesting personal health information.^{3,4} However, studies reportedly indicated that much as the digital environment is typically a critical source for health information acquisition, the extensive information diversity raises the concern of finding relevant information.^{5,6} Additionally, many internet users who search for health information cannot properly evaluate the quality of websites, are open to misinformation, cannot fully comprehend the acquired information, and fail to contextualize information correctly.⁷

Studies revealed that health literacy plays a decisive role in health information acquisition, analysis, and attainment of the cognitive and social skills that enable individuals to access proper healthcare information on social platforms.⁸ A high level of health literacy fosters individuals' acquisition and figure outing of health-related information in the digital environment, as well as significantly influence their healthy lifestyle, well-being, level of utilizing health services, patient satisfaction, level of adherence to treatment, reasonable drug use, and patient safety and life quality.⁹⁻¹¹

Information acquisition in digital settings undeniably improves personal empowerment by offering diverse health services, such as advisory, education, and follow-up.¹² Individuals who access the digital environment for health information acquisition will expectedly cooperate more with health professionals, improve their decision-making skills, use health services better, and thus feel more empowered.¹³ However, some other studies emphasized that as patients become empowered, their adherence to the doctor may be adversely affected, and they may feel exhausted, confused, or misdirected by the information acquired from digital platforms.¹⁴

Several studies reported that information acquisition from digital platforms is necessary and effective for patients to adopt behavioral changes and successfully manage the disease to prevent chronic illnesses.¹⁵⁻¹⁷ The literature also revealed that health information acquisition from digital media largely favorably impacted chronic illness management - despite a few contradictory citations.^{17,18} Therefore, the absence of any study in the literature assessing the relationship between the variables of acquiring and verifying health information in the digital environment, health literacy, and patient empowerment necessitated carrying out the current research. The findings of this study will

anticipatingly make a substantial contribution to the available literature. This study aimed to identify the effect of digital health information acquisition and verification behaviors of chronically ill patients on health literacy and patient empowerment and assess the relationship between the relevant outcomes using a path analysis.

Methods. The study is in descriptive and correlational design. Using a set population sampling formula, the sample size calculator program computed the population size as 365 persons, with a 95% confidence interval and a 5% margin of error.

The study population consisted of patients who referred to the internal medicine outpatient clinic because of their chronic disease, between February and May 2023. The convenience sampling method was utilized for sample selection in the research. The inclusion criteria for the study are: voluntary participation, a chronic illness, and no communication problems. Those below the age of 18 and those who answered the questions incompletely were excluded from the study.

All procedures established for studies including human participants were in accordance with the 1964 Declaration of Helsinki. The ethical approval for this study has been adopted from the Faculty of Medicine, Sakarya University, Sakarya, Turkey (date: 15.02.2022, no.: 47). In addition, written consent was obtained from the participants in the study.

The researchers collected the study data through face-to-face questionnaires. Responding to the questionnaires took approximately 20 minutes. The researchers typically used a personal information form, the behavior scale for health information acquisition and verification in digital setting, patient empowerment scale, and health literacy scale to collect the study data.

The personal information form developed by the literature review involved 10 queries, including the participant's gender, age, marital status, educational status, and economic status. This form also inquired on patients' chronic illnesses, where they typically got information regarding their illnesses, which digital media utilized the most for information acquisition, how much time patients spent on the Internet during the daytime, and whether they would consider attending online training.

As developed by Çömlekçiet al,² Scale for Health Information Acquisition and Verification consisted of 10 items and 3 sub-dimensions. While the "Web 1.0 and health information acquisition" sub-dimension describes the cases in that users prefer non-interactive

Disclosure. Authors have no conflict of interests, and the work was not supported or funded by any drug company.

environments instead of social media platforms while doing web-based health information searches. The “Web 2.0 and digital health information acquisition” sub-dimension also expresses the contexts in which users access health information through social media platforms such as Instagram, YouTube, or Twitter. However, the “digital verification” sub-dimension clarifies the methodologies that users execute to verify the acquired health information from digital media. The scale was a 5-point Likert-type and took the averages of the relevant items to calculate the scale values. Accordingly, higher scores on the scale signified an increase in participants’ digital health information acquisition and verification behaviors.

In patient empowerment scale, the lowest score from the 5-point Likert scale is 37, while the highest score is 185. This scale consisted of 5 sub-dimensions: identity/identicalness, self-control, decision-making, recognition and comprehension, and interaction with others.¹⁹

Health literacy scale consisted of 25 components and four sub-dimensions, containing access to information, understanding information, appraisal/evaluation, and application/use. The minimum score that can be obtained from the scale is 25, while the maximum score that can be obtained is 125.²⁰

Statistical analysis. The study used the Statistical Package for the Social Sciences, version 25.0 (IBM Corp., Armonk, NY, USA) for Windows and Smart PLS 3 program to analyze the study data.²¹ The data were analyzed quantitatively. The study calculated the construct reliability (composite reliability [CR]) value for composite reliability, the average variance value (average variance extracted [AVE]) explained for convergent validity, and the Fornell-Larcker criterion, Heterotrait-Monotrait (HTMT) ratio values for discriminant validity within the scope of the measurement model.²¹

The study also used the following procedure for data analysis: as initially carrying out a confirmatory factor analysis to evaluate the reliability and validity of the study instrument, the study utilized a Smart PLS path model analysis to test the 3 hypotheses. The outcomes of this test would explicitly indicate the presence of significant correlations between the independent and dependent variables. Subsequently, the R^2 value was used as an indicator for the overall predictive power of the model based on the following values: 0.67 as substantial, 0.33 as moderate, and 0.19 as weak.^{22,23} Then, the f^2 value was used as a scale to set the effect size of predicting variables in the model based on the following values: 0.35 as large, 0.15 as medium, and 0.02 as weak.²³ Finally, if the Q^2 value for a dependent

variable was higher than zero, it indicated that the model had predictive relevance. The statistical significance level was considered 2-sided and 5%.

Results. The average age of the study participants was 58.80 ± 13.50 years. Approximately 55.6% of the participants were women, 80% were married, 52.9% received primary school education or below, and 69% retained a moderate economic status. Analysis of the participants’ pre-existing illness conditions revealed that 47.1% had hypertension, 60% had diabetes, 12.1% had chronic obstructive respiratory disease (COPD), and 3% had cancer. While almost 77.3% of the participants primarily acquired their illness-related information from healthcare professionals, 46.3% preferred to use the phone for information acquisition from the digital environment. Furthermore, approximately 77.1% of the participants expressed that they spent 0-2 hours of daytime on the internet, and 83% of the participants demanded that face-to-face education is much better than receiving online education.

Structural modelling of path diagram (**Figure 1**) demonstrates whether “health literacy” is a mediating variable on the way from “health information acquisition and verification in digital environment” to “patient empowerment” for chronically ill patients.

Table 1 displays the reliability and validity data for the variables within the context of the measure model. The Cronbach’s alpha value for all constructs was over 0.60 (between 0.721-0.930). Cronbach Alpha and rho_A values greater than 0.60 indicated that the scales were dependable, and the internal consistency of the variable utilized in the study was satisfactory.²⁶ Additionally, all factor loads were higher than 0.4, and the CR values for all constructs were higher than 0.7 (ranging from 0.745-0.930) and is higher than its respective AVE. This data suggested satisfactory construct reliability and convergent validity. The AVEs were higher than 0.5 for all constructs.

As presented in **Table 2**, the correlation coefficients for the variables were lower than the square root of the AVE values, indicating that the Fornell-Larcker criteria was satisfied. The analysis outcomes also disclosed that the HTMT values were below the threshold (<0.90). Therefore, based on the findings in **Table 3**, it is possible to finalize that the divergent validity was satisfied.

The model analysis results in **Table 3** and **Figure 1** revealed that the ‘Web 1.0 and health information acquisition’ and ‘digital verification’ variables affected the ‘access to information’ variable statistically and significantly ($p < 0.05$). Considering the explanation ratio of the model. However, the ‘Web 1.0 and health information acquisition’ and ‘digital verification’

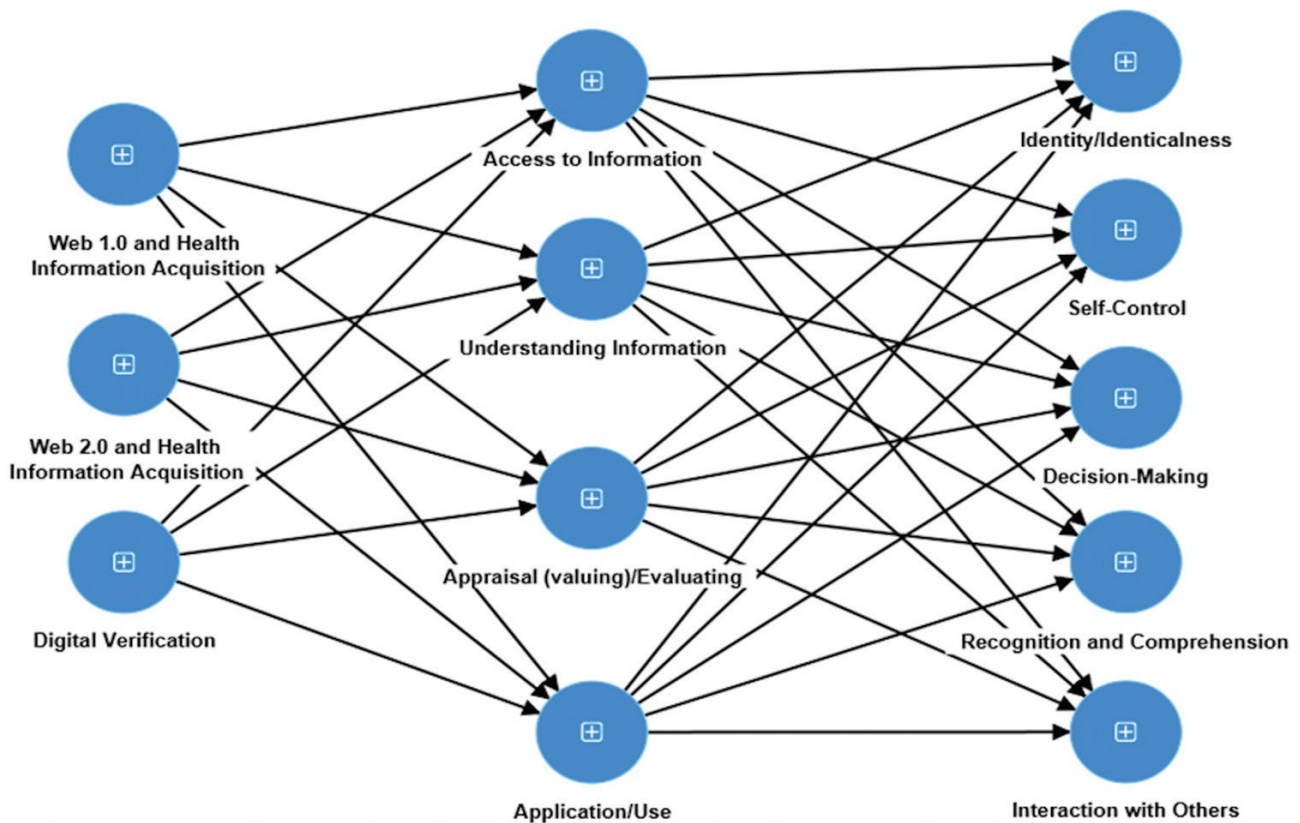


Figure 1 - Structural modelling of path diagram.

accounted for 27.2% of the variation in the 'access to information.' Furthermore, the 'Web 1.0 and health information acquisition' variable statistically and significantly affected the 'understanding information' and 'appraisal/evaluation' variables ($p < 0.05$). The explanation rates of the model for these 2 variables were 27.2% and 29.1%. Correspondingly, the 'Web 1.0 and health information acquisition,' 'Web 2.0 and health information acquisition,' and 'digital verification' had a statistically significant effect on the 'application/use' ($p < 0.05$). These 3 variables of the model, however, explained 29% of the variation in the 'application/use' variable.

The findings also demonstrated that the 'access to information' had a statistically significant effect on the 'identity/identicalness' and 'self-control' ($p < 0.05$), and the 'access to information' variable explained 66.8% and 73.1% of the variations in 'identity/identicalness' and 'self-control' variables.

The study further identified that the 'access to information' and 'appraisal/evaluation' affected the 'decision-making' statistically and significantly ($p < 0.05$). considering the explanation ratio of the model, the

'access to information' and 'appraisal/evaluation' variables accounted for 73.6% of the variation in the 'decision-making' variable.

Finally, the 'access to information' and 'application/use' had a statistically significant effect on the 'recognition and comprehension' ($p < 0.05$), and accordingly, these 2 variables explained 70.3% of the variation in the 'recognition and comprehension' variable. The analysis outcomes also exposed that the 'access to information' statistically and significantly affected the 'interaction with others' ($p < 0.05$). Considering the explanation ratio, however, the 'access to information' variable accounted for 52.8% of the variation in the 'interaction with others' variable.

Discussion. The increment of digital communication tools in social life has diversified individuals' information sources and improved their access to information. Since the subject is health-related information, the role of internet-based sources and social networks has gradually increased. The vast coverage of health-related information and its high level of anonymization has resulted in individuals adopting

Table 1 - Reliability results of the variables related to the research model.

Variables	Scale items	Factor load	Cronbach's Alpha	rho_A	Composite reliability	AVE
Interaction with others	PES7	0.744	0.857	0.865	0.858	0.550
	PES10	0.727				
	PES16	0.609				
	PES26	0.835				
	PES33	0.774				
Understanding information	HLS6	0.811	0.929	0.932	0.928	0.651
	HLS7	0.736				
	HLS8	0.760				
	HLS9	0.815				
	HLS10	0.751				
	HLS11	0.822				
	HLS12	0.935				
Access to information	HLS1	0.833	0.925	0.926	0.925	0.711
	HLS2	0.864				
	HLS3	0.898				
	HLS4	0.803				
	HLS5	0.814				
Recognition and comprehension	PES8	0.754	0.909	0.912	0.908	0.555
	PES11	0.721				
	PES15	0.667				
	PES19	0.747				
	PES22	0.708				
	PES30	0.883				
	PES34	0.677				
	PES36	0.779				
Appraisal/evaluation	HLS13	0.773	0.930	0.931	0.930	0.624
	HLS14	0.769				
	HLS15	0.787				
	HLS16	0.804				
	HLS17	0.697				
	HLS18	0.774				
	HLS19	0.832				
Digital verification	HLS20	0.870	0.908	0.913	0.908	0.712
	SHIAV7	0.757				
	SHIAV8	0.804				
	SHIAV9	0.929				
Decision-making	SHIAV10	0.874	0.878	0.882	0.878	0.509
	PES1	0.747				
	PES2	0.622				
	PES4	0.673				
	PES18	0.641				
	PES21	0.717				
	PES24	0.774				
	PES27	0.800				
Identity/identicalness	PES6	0.793	0.922	0.925	0.922	0.570
	PES12	0.637				
	PES14	0.691				
	PES20	0.791				
	PES23	0.807				
	PES25	0.742				
	PES29	0.829				
Self-control	PES32	0.730	0.884	0.887	0.883	0.520
	PES37	0.757				
	PES3	0.707				
	PES5	0.802				
	PES9	0.613				
	PES13	0.648				
	PES17	0.714				
Application/use	PES28	0.784	0.877	0.886	0.878	0.592
	PES35	0.757				
	HLS21	0.852				
	HLS22	0.798				
	HLS23	0.629				
	HLS24	0.718				
Web 1.0 and health information acquisition	HLS25	0.829	0.840	0.844	0.841	0.638
	SHIAV1	0.799				
	SHIAV2	0.853				
Web 2.0 and health information acquisition	SHIAV3	0.741	0.721	0.786	0.745	0.601
	SHIAV5	0.627				
	SHIAV6	0.900				

AVE: average variance extracted, PES: patient empowerment scale, HLS: health literacy scale, SHIAV: scale for health information acquisition and verification

Table 2 - Fornell-Larcker criterion analysis and Heterotrait-Monotrait ratio.

Variables	Fornell-Larcker criterion											
	1	2	3	4	5	6	7	8	9	10	11	12
1- Interaction with others	0.742											
2- Understanding information	0.622	0.807										
3- Access to information	0.714	0.799	0.843									
4- Recognition and comprehension	0.674	0.724	0.817	0.745								
5- Appraisal/evaluation	0.690	0.778	0.781	0.559	0.790							
6- Digital verification	0.529	0.437	0.502	0.516	0.483	0.844						
7- Decision-making	0.680	0.708	0.719	0.681	0.635	0.581	0.713					
8- Identity/identicalness	0.632	0.685	0.710	0.535	0.663	0.446	0.530	0.755				
9- Self-control	0.573	0.722	0.726	0.597	0.522	0.555	0.635	0.661	0.720			
10- Application/use	0.588	0.752	0.789	0.504	0.538	0.481	0.619	0.664	0.626	0.770		
11- Web 1.0 and health information acquisition	0.570	0.506	0.492	0.510	0.530	0.618	0.622	0.487	0.540	0.506	0.799	
12- Web 2.0 and health information acquisition	0.529	0.259	0.375	0.365	0.408	0.651	0.558	0.437	0.468	0.275	0.642	0.776
Variables	Heterotrait-Monotrait ratio											
	1	2	3	4	5	6	7	8	9	10	11	12
1- Interaction with others												
2- Understanding information	0.616											
3- Access to information	0.713	0.795										
4- Recognition and comprehension	0.878	0.721	0.814									
5- Appraisal/evaluation	0.687	0.875	0.880	0.753								
6- Digital verification	0.535	0.440	0.500	0.517	0.483							
7- Decision-making	0.881	0.706	0.815	0.874	0.834	0.592						
8- Identity/identicalness	0.836	0.681	0.808	0.736	0.759	0.452	0.825					
9- Self-control	0.883	0.722	0.821	0.799	0.811	0.564	0.831	0.862				
10- Application/use	0.688	0.847	0.890	0.798	0.839	0.480	0.816	0.760	0.822			
11- Web 1.0 and health information acquisition	0.570	0.509	0.491	0.511	0.531	0.825	0.633	0.493	0.550	0.505		
12- Web 2.0 and health information acquisition	0.547	0.265	0.381	0.386	0.416	0.798	0.581	0.458	0.497	0.281	0.653	

Heterotrait-Monotrait ratio of <0.90

behaviors of searching out health information through online platforms.³ Yet, the diversified and increased information resources and facilitated information access have diminished individuals' levels of concern and improved their self-reliance. At this point, health literacy is crucial to making it easier for individuals to access reliable health information on social media settings and to acquire and analyze it.¹⁸ Studies have reportedly indicated that a high degree of health literacy accelerates the processes of reading and understanding health-related information from digital sources.⁹ Advanced health literacy also facilitates individuals accessing and recognizing health-related resources, enabling them to protect and improve their health statuses. Therefore, using a structural equation model, this study revealed the relationship between health information acquisition and verification behaviors in the digital environment, health literacy, and patient empowerment.

The current study also determined that the health information acquisition behaviors through web portals without using social media platforms significantly and positively affected all sub-dimensions of the health literacy scale. Unquestionably, internet usage to search for and acquire information raises the literacy level of individuals (due to the diversity of information sources available in digital settings) and gives them search opportunities before making health-related decisions.²⁴ In a study carried out in Nigeria found that the behavior of seeking for health information on the internet is among the determiners of health literacy.²⁵ Another study with university students reportedly used the logistic regression analysis and identified the relationship between online health information-searching behaviors and health literacy variables. Correspondingly, Lee et al²⁶ and Estacio et al²⁷ also found comparable results in their search. As a result, it is viable to infer from the literature

Table 3 - Model analysis results.

Hypothesis	β	t	P-values	F ²	R ²	Q ²	Results
Web 1.0 and health information acquisition → access to information	0.247	2.182	0.030*	0.028	0.272	0.177	✓
Web 2.0 and health information acquisition → access to information	-0.017	0.186	0.852	0.000			✗
Digital verification → access to information	0.316	2.549	0.011*	0.033			✓
Web 1.0 and health information acquisition → understanding information	0.473	3.529	0.000*	0.097	0.272	0.152	✓
Web 2.0 and health information acquisition → understanding information	-0.187	1.449	0.148	0.021			✗
Digital verification → understanding information	0.190	1.403	0.161	0.013			✗
Web 1.0 and health information acquisition → appraisal/evaluation	0.412	3.100	0.002*	0.075	0.291	0.164	✓
Web 2.0 and health information acquisition → appraisal/evaluation	0.086	0.641	0.522	0.004			✗
Digital verification → appraisal/evaluation	0.082	0.661	0.509	0.003			✗
Web 1.0 and health information acquisition → application/use	0.362	3.226	0.001*	0.059	0.290	0.148	✓
Web 2.0 and health information acquisition → application/use	-0.216	1.997	0.046*	0.029			✓
Digital verification → application/use	0.347	2.689	0.007*	0.043			✓
Access to information → identity/identicalness	0.585	4.330	0.000*	0.200	0.668	0.362	✓
Understanding information → identity/identicalness	-0.004	0.123	0.902	0.000			✗
Appraisal/Evaluation → identity/identicalness	0.156	0.973	0.331	0.008			✗
Application/use → identity/identicalness	0.105	0.514	0.608	0.002			✗
Access to information → self-control	0.385	2.852	0.005*	0.106	0.731	0.360	✓
Understanding information → self-control	-0.070	0.829	0.408	0.005			✗
Appraisal/evaluation → self-control	0.280	1.429	0.154	0.028			✗
Application/use → self-control	0.285	1.498	0.135	0.029			✗
Access to information → decision-making	0.341	2.671	0.008*	0.086	0.736	0.354	✓
Understanding information → decision-making	-0.166	1.734	0.084	0.023			✗
Appraisal/evaluation → decision-making	0.535	3.104	0.002*	0.096			✓
Application/use → decision-making	0.159	0.903	0.367	0.010			✗
Access to information → recognition and comprehension	0.516	3.609	0.000*	0.173	0.703	0.367	✓
Understanding information → recognition and comprehension	0.145	1.158	0.247	0.014			✗
Appraisal/evaluation → recognition and comprehension	-0.262	1.247	0.213	0.019			✗
Application/use → recognition and comprehension	0.472	2.465	0.014*	0.071			✓
Access to information → interaction with others	0.441	2.804	0.005*	0.080	0.528	0.277	✓
Understanding information → interaction with others	0.009	0.061	0.952	0.000			✗
Appraisal/Evaluation → interaction with others	0.195	0.938	0.349	0.007			✗
Application/use → interaction with others	0.110	0.554	0.580	0.003			✗

*P-value of <0.05, β : effect coefficient, F²: effect size, R²: explanation ratio, Q²: predictive power

that the digital platforms enabling individuals to access information positively influence their personal decisions and behaviors and public health-related concerns. Furthermore, improving health literacy (especially for chronically ill patients) significantly contributes to disease processes, including diagnosis, treatment, and management.²⁸

Digital verification behavior refers to users' testing the relevancy of health information acquired from digital media using various methods.² Yet, digital platforms are the settings where people may freely post and share whatever they wish, and personal and corporate comments may spread readily, especially on social

media, with a limited verification process. Verifying the information available on the internet is critical to prohibit the rapid spread of false or unconfirmed information.²⁹ This study, in this context, revealed that the digital verification practices of the participants increasingly influenced their behavior of applying or using health-related information, a sub-dimension of the health literacy scale. A research carried out with university students reported a linear relationship between students' digital verification behaviors and their interactive health literacy.¹⁶ Correspondingly, Özen et al³⁰ also emphasized that the verification process of the information reliability acquired by

health professionals from the internet or other digital platforms would positively affect individuals' health behaviors. Therefore, it is essential for health promotion to identify which platforms individuals utilize to access health information and to what content and in what forms they verify the relevance of the data acquired.

The current study found that the access to information sub-dimension of the health literacy scale substantially influences all sub-dimensions related to the patient empowerment scale. The term 'access to information' refers to the practices, including information gathering, data scanning, and classification, which individuals follow to access relevant information. The era in which we live is entitled the "information age," accumulating information at an exceedingly rapid rate. Digital environs provide great convenience in adapting to this incredible speed. Digital platforms also enable chronically ill patients to access and use health-related information resources efficiently, express their individual preferences by fostering their self-efficacy, control, and competence skills, participate effectively in decision-making processes, access the resources they need, and develop strong relationships with others. As a result, these practices potentially help them improve their quality of life. In this context, Mano et al³¹ reported that telehealth and social media in accessing information and effective communication with physicians positively influence patient empowerment among chronically ill patients. They further indicated that especially digital platforms are frequently used by both patients and physicians as they serve prompt access to information. Jiang et al³² also stated that internet use for accessing health-related information is highly effective for patient empowerment based on their conclusions from hierarchical regression analysis. Some studies added to the literature, on the other hand, highlighted the possibility of accessing health-related misinformation from unsecured websites or social media platforms, which could then spread to large masses, leading to adverse and poor health outcomes.^{7,33,34} Therefore, accessing proper information would ideally raise individuals' health literacy level, enabling them to control their health conditions and better perceive and assess the issues related to their illnesses.

Study limitations. This study also carried out a cross-section data analysis. The relationships among the variables being correlational do not imply cause and effect. The study participants' high average age, combined with more than half of them having only completed primary school or below education level, may be viewed as a barrier to their usage of the internet or digital tools. Despite these limitations, the study findings provided practical outcomes for health

professionals focused on health literacy and patient empowerment topics among chronically ill individuals.

In conclusion, the current study findings revealed that the chronically ill patients' behaviors of health information acquisition from web environs without using social media platforms have an increasing effect on all sub-dimensions of the health literacy scale. The 'access to information' sub-dimension of the health literacy scale also positively affected all the sub-dimensions of the patient empowerment scale. Besides, digital verification behavior significantly improved the 'access to information' and 'application/use' sub-dimensions under the health literacy scale.

It is, therefore, necessary to raise the health literacy level for chronically ill patients to properly manage their illnesses and achieve self-efficacy, control, and competence over their health concerns. However, ensuring the reliability of the digital settings used frequently for information acquisition is also critical in this process. In this sense, given the issue of misinformation regarding health concerns impacting the entire world, it is viable to recommend feeding patients with specialized training to advance their media or digital literacy skills and enable them to utilize the internet efficiently. Health practitioners should also facilitate health-protective and educational programs to allow individuals to make health-related decisions in the light of the correct information.

Acknowledgment. The authors gratefully acknowledge Blue Tower educational services (<http://www.bluetoweredu.com/>) for the English language editing.

References

1. Madrigal L, Escoffery C. Electronic health behaviors among US adults with chronic disease: cross-sectional survey. *J Med Internet Res* 2019; 21: e11240.
2. Çömlekçi MF, Bozkanat E. Behaviors on obtaining and verifying health information from digital media during the infodemic. *Istanbul University Press* 2021; 41: 103-125.
3. Jia X, Pang Y, Liu LS. Online health information seeking behavior: a systematic review. *Healthcare (Basel)* 2021; 9: 1740.
4. Schuster AM, Ghaiomy Anaraky R, Cotten SR. Online health information seeking and the association with anxiety among older adults. *Front Public Health* 2023; 11: 1076571.
5. Kocademir L, Gerçek E. Use of digital media in prenatal and postnatal period. *J of Women's Health Nurs* 2020; 6: 29-43.
6. Newman N, Fletcher R, Schulz A, Andi S, Nielsen RK. Reuters digital news report. [Updated 2020; accessed 2023 Jun 26]. Available from: https://reutersinstitute.politics.ox.ac.uk/sites/default/files/202006/DNR_2020_FINAL.pdf
7. Rodgers K, Massac N. Misinformation: a threat to the public's health and the public health system. *J Public Health Manag Pract* 2020; 26: 294-296.

8. Urstad KH, Andersen MH, Larsen MH, Borge CR, Helseth S, Wahl AK. Definitions and measurement of health literacy in health and medicine research: a systematic review. *BMJ Open* 2022; 12: e056294.
9. Kilit DÖ, Eke E. Evaluation of health information seeking behaviour of individuals: example of Isparta province. *Hacettepe J of Health Admin* 2019; 22: 401-436.
10. Qi S, Hua F, Xu S, Zhou Z, Liu F. Trends of global health literacy research (1995-2020): analysis of mapping knowledge domains based on citation data mining. *PLoS One* 2021; 16: e0254988.
11. Shahid R, Shoker M, Chu LM, Frehlick R, Ward H, Pahwa P. Impact of low health literacy on patients' health outcomes: a multicenter cohort study. *BMC Health Serv Res* 2022; 22: 1148.
12. Daruwalla Z, Thakkar V, Aggarwal M, Kiasatdolatabadi A, Guergachi A, Keshavjee K. Patient empowerment: the role of technology. *Stud Health Technol Inform* 2019; 257: 70-74.
13. Yang H, Guo X, Zeyu P, Lai KH. Patient empowerment in an online health platform: exploring the quadratic effect of patient' conscious - competence on perceived health status. *Computers in Human Behavior* 2022; 136: 107346.
14. Bodolica V, Spraggon M. Toward patient-centered care and inclusive health-care governance: a review of patient empowerment in the UAE. *Public Health* 2019; 169: 114-124.
15. Zhang X, Qiao X, Peng K, Gao S, Hao Y. Digital behavior change interventions to reduce sedentary behavior and promote physical activity in adults with diabetes: a systematic review and meta-analysis of randomized controlled trials. *Int J Behav Med* 2023.
16. Aydemir İ, Yaşar ME. Determining the relationship between health knowledge in digital environment and confirmation behavior, and the health literacy information level of a university staff. *Bingöl University Social Sciences Institute Journal* 2022; 25: 123-134.
17. Joseph-Shehu EM, Ncama BP, Mooi N, Mashamba-Thompson TP. The use of information and communication technologies to promote healthy lifestyle behaviour: a systematic scoping review. *BMJ Open* 2019; 9: e029872.
18. Sbaifi L, Zhao C. Modeling the online health information seeking process: information channel selection among university students. *J Assoc Inf Sci Technol* 2020; 71: 196-207.
19. Kaya N, Işık O. Validity and reliability of the patient empowerment scale in Turkish. *J of Business Sci* 2018; 6: 27-42.
20. Aras Z, Bayık Temel A. Evaluation of validity and reliability of the Turkish version of health literacy scale. *Florence Nightingale J Nurs* 2017; 25: 85-94.
21. Doğan D. Data analysis with smart PLS. Ankara: Zet Publications; 2019.
22. Hair JF, Risher JJ, Sarstedt M, Ringle CM. When to use and how to report the results of PLS-SEM. *European Business Review* 2019; 31: 2-24.
23. Hair JF, Black WC, Babin BJ, Anderson RE, Tatham L. Multivariate data analysis. Eighth Edition. ABD: Cengage Learning; 2019.
24. Urstad KH, Andersen MH, Larsen MH, Borge CR, Helseth S, Wahl AK. Definitions and measurement of health literacy in health and medicine research: a systematic review. *BMJ Open* 2022; 12: e056294.
25. Kuyinu YA, Femi-Adebayo TT, Adebayo BI, Abdurraheem-Salami I, Odusanya OO. Health literacy: prevalence and determinants in Lagos State, Nigeria. *PLoS One* 2020; 15: e0237813.
26. Lee HY, Jin SW, Henning-Smith C, Lee J, Lee J. Role of health literacy in health-related information-seeking behavior online: cross-sectional study. *J Med Internet Res* 2021; 23: e14088.
27. Estacio EV, Whittle R, Protheroe J. The digital divide: examining socio-demographic factors associated with health literacy, access and use of internet to seek health information. *J Health Psychol* 2019; 24: 1668-1675.
28. Liu L, Qian X, Chen Z, He T. Health literacy and its effect on chronic disease prevention: evidence from China's data. *BMC Public Health* 2020; 20: 690.
29. Swire-Thompson B, Lazer D. Public health and online misinformation: challenges and recommendations. *Annu Rev Public Health* 2020; 41: 433-451.
30. Özen N, Topbaş M. Obtaining accurate and reliable health information on the internet and social media. *Farabi Medical Journal* 2023; 2: 27-32.
31. Mano MS, Morgan G. Telehealth, social media, patient empowerment, and physician burnout: seeking middle ground. [Updated 2022; 2024 Feb 12]. Available from: http://ascopubs.org/doi/full/10.1200/EDBK_100030
32. Jiang S, Street RL Jr. The effects of patient-centered communication, social capital, and internet use on patient empowerment: a cross-sectional study in China. *Glob Health Promot* 2019; 26: 33-43.
33. Pulido CM, Ruiz-Eugenio L, Redondo-Sama G, Villarejo-Carballido B. A new application of social impact in social media for overcoming fake news in health. *Int J Environ Res Public Health* 2020; 17: 2430.
34. Cuan-Baltazar JY, Muñoz-Perez MJ, Robledo-Vega C, Pérez-Zepeda MF, Soto-Vega E. Misinformation of COVID-19 on the internet: infodemiology study. *JMIR Public Health Surveill* 2020; 6: e18444.