

# Development and Psychometric Properties of the Online Health Information-Seeking Skill Scale

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## Abstract

**Aims:** Given the dearth of research about middle-aged people's ability to seek online health information in developing countries, this study was conducted to develop the Online Health Information-Seeking Skill Scale (OHI-SSS) and evaluate its psychometric properties. **Materials and Methods:** This is a methodological study in which a scale was developed within three factors and was validated by face validity, content validity, and structural validity methods. Four hundred and twenty middle-aged individuals completed the questionnaires. Internal consistency and test-retest were used to evaluate the reliability of the scale. **Finding:** The initial scale, consisting of 38 items on a 5-point Likert scale, was reduced to a 26-item scale following face and content validity measurement. The exploratory factor analysis extracted three subscales in OHI-SSS that includes "information reception," "provide and exchange information, and "identification and trust." Internal consistency of the scale was confirmed by Cronbach's alpha coefficient (0.93). Cronbach's alpha coefficient for subscales was 0.87, 0.795, and 0.74, respectively. Reliability analysis with test-retest revealed an acceptable estimate for the total score (intraclass correlation coefficient = 0.92). **Conclusion:** The 20-item OHI-SSS has acceptable validity and reliability. Therefore, it can be employed as an appropriate instrument for the evaluation of middle-aged people's skills in seeking online health information.

**Keywords:** Adults, health, information seeking, Internet, skill

## INTRODUCTION

The number of health-related websites has increased to be much more than information sites.<sup>[1]</sup> Many people seek online health information to get answers to their questions.<sup>[2]</sup> Online health information covers topics such as the exchange of experiences and finding of support, as well as information and advice.<sup>[3]</sup> It was shown in a study in Kuwait (2018) that 93.2% of people used the Internet and 62.9% of them sought online health information to promote self-care behaviors.<sup>[4]</sup>

Self-care is the most important form of primary care.<sup>[5]</sup> Providing online health information is a new and emerging phenomenon and one of the sub-branches of telecare.<sup>[6]</sup> This method of care creates an opportunity for interaction between

users and health-care professionals,<sup>[7]</sup> provided that users have the skills of accessing online information. Paying attention to individuals' skills in using online health information, the distinctive nature of users, psychological and social issues, privacy, information quality, and legality are new topics that need to be explored.<sup>[2]</sup>

Holman and Lorig (2013) state that resource-utilizing skills are one of the core skills of self-care.<sup>[8]</sup> Many health-care providers introduce resources to participants but do not teach them how to use these resources.<sup>[5]</sup> Therefore, before introducing resources, especially electronic resources, it is necessary to evaluate the skill of using them in the user by a valid tool.

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Literature review shows that the available instruments are not developed specifically to assess people's skills in seeking online health information. The instruments have been developed by reviewing the articles and have not used the direct experiences of individuals.<sup>[1,9-13]</sup>

For example, Razmak and Bélanger developed a tool to assess the use of certain technologies by physicians and patients.<sup>[12]</sup> Wong and Cheung conducted a study to investigate the relationship between online health information seeking and eHealth literacy among patients attending a primary care clinic.<sup>[13]</sup> Kelly *et al.* developed an instrument for measuring the potential consequences and experiences a person may encounter when using health-related websites.<sup>[11]</sup>

Addressing the needs of the middle-aged population is critical to online health information seeking. The reason is that this group of people enters the aging stage after middle age and their health and medical needs impose a heavy burden on the health-care system.<sup>[14]</sup> The skill of seeking online health information will aid greatly in meeting the ever-increasing needs of this rapidly growing population for cost-effective health care. For this reason, health policymakers and even web developers need to have basic information about the skill of middle-aged people for online health information seeking. Owing to the low number of studies in this area, and heterogeneous measurement of skills in seeking online health information, this study was conducted to develop a scale of measuring middle-aged people's skills for online health information seeking.

## MATERIALS AND METHODS

This methodological study was conducted between February 2020 and April 2021 on middle-aged people referred to Urban Comprehensive Health Service Centers in Kashan. The methodological studies include two qualitative and quantitative phases, respectively.<sup>[15]</sup>

In the first phase of the study, the item pool was developed through interviews with 16 middle-aged people and a literature review. Interviews were conducted with middle-aged people who had access to the Internet via smartphones, computers, or laptops. The main interview questions included: For what purposes do you use the Internet? What are your uses of the Internet with health and hygiene? Interviews were analyzed using the content analysis method, and Graneheim and Lundman's approach. Finally, 86 codes and 3 main themes (identification and trust, information exchange, and provision and information reception) were extracted from the interviews. Categories and subcategories were used to generate the primary item pool for the Online Health Information-Seeking Skill Scale (OHI-SSS). The available literature and instruments will also be used for item generation.

In the second phase of the study, the initial scale was developed with 36 items. The scoring tool was a 5-point Likert scale

with the following options: "very good = 5," "good = 4," "somewhat = 3," "little = 2," and "never = 1." The higher the scores acquired by the participants, the higher would be the skill of seeking online health information.

After the development of the initial scale, the psychometric properties including face validity (quantitative and qualitative), content validity (quantitative and qualitative), structural validity, and reliability were examined, respectively.

To evaluate the qualitative and quantitative face validity, the scale was provided to 12 middle-aged people to determine the level of difficulty of the phrases, the relationship of the phrases with the main purpose of the scale, ambiguity, and inadequacies in the meaning of words.<sup>[16]</sup> In addition, they were asked to rate the importance of each item on a 5-point Likert scale ranging from 1 (not important at all) to 5 (very important).

Then, the impact score of each item was calculated according to the following formula. If the item impact was equal to or greater than 1.5, the item was retained.<sup>[17]</sup> Formula: Item impact = the importance × frequency (percent). At this stage, two items had a score of <1.5 and, therefore, were deleted.

To test the qualitative and quantitative content validity, eight nursing professionals who were experts in the development of scale and six health information management and technology experts were asked to provide corrective views on grammar, use of appropriate and intelligible words, and proper scoring scale. In addition, they were asked to rate the necessity of each item on a 3-point Likert scale (3 = necessary, 2 = useful but not necessary, and 1 = not necessary).

Then, content validity ratio (CVR) was calculated. According to the Lawshe table, items <0.51 were deleted.<sup>[17]</sup> CVR of all tool items was 0.57 and more and, thus, no item was deleted. In addition, the above 14 experts were asked to give their comments on the relevance of the scale items based on a 4-point Likert scale (1 = not relevant, 2 = relatively relevant, 3 = relevant, and 4 = quite relevant). Then, the content validity index (CVI) was calculated for each item. The items with CVI values above 0.79 were considered to be acceptable.<sup>[18]</sup> CVI of all tool items was 0.86 and greater and, thus, no item was deleted. Moreover, scale-level CVI (S-CVI) was assessed via mean scores for the item-level CVI (I-CVI). S-CVI values of >0.9 indicate that it is acceptable.<sup>[18]</sup> S-CVI of the tool was 0.92.

Scale's construct validity was evaluated with a cross-sectional study via exploratory factor analysis. The researcher received a list of all people aged 40–60 based on their electronic records from Urban Comprehensive Health Service Centers, Kashan (every citizen in Iran has an electronic health record in Urban Comprehensive Health Service Centers). Then, according to the sample size, individuals were randomly selected. Harrington argues that a sample size of 300 subjects and above is appropriate for the exploratory factor analysis.<sup>[19]</sup> In this study, the sample

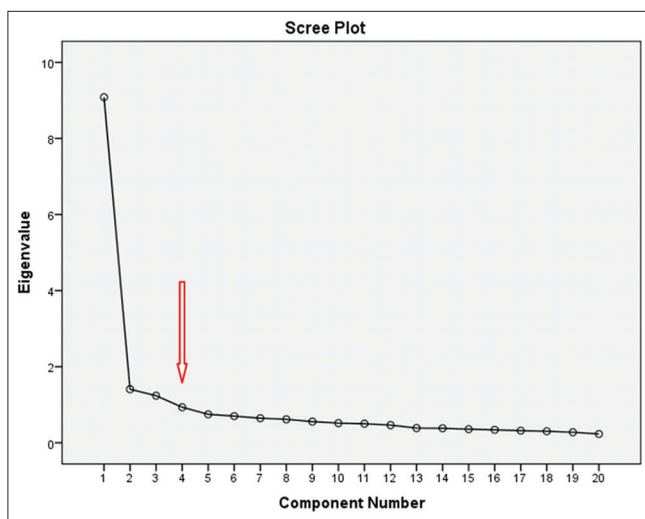
size was considered to be 450, but 430 subjects completed the questionnaires.

Through telephone contact with the samples, the objectives and methods of study were explained to them and verbal consent was obtained from the participants of the study. Then, the informed consent form and questionnaire were sent to the participants through WhatsApp. If a subject withdrew from the collaboration, another sample would randomly be replaced from the same center. After data collection, exploratory factor analysis was performed to extract the latent constructs of OHI-SSS. Principal components analysis (PAC) and varimax rotation were the methods of extracting latent constructs. Eigenvalue above 1, scree plot [Graph 1], and minimum factor load of 0.4 were considered for the items.

Scale's reliability was evaluated with Cronbach's alpha coefficient. The values above 0.7 were considered to be acceptable.<sup>[20]</sup> Stability was evaluated via the test-retest technique. The questionnaire was given to 20 middle-aged people twice with a 2-week interval and intraclass correlation coefficient (ICC) was calculated for the questionnaire and its subscales. ICC values above 0.75 showed acceptable stability.<sup>[21]</sup>

Data analyses were conducted with Statistical Package for the Social Sciences version 16 (SPSS Inc., Chicago, IL, USA). Descriptive statistics were used to summarize demographic characteristics. Construct validity was determined through running exploratory factor analysis. Moreover, statistical analyses including Pearson correlation analysis and paired- and independent-samples *t*-tests were performed. Kaiser-Meyer-Olkin (KMO) test was also used to determine the adequacy of the selected sample size for factor analysis.

This study was approved by the Ethics Committee of Kashan University of Medical Sciences, Iran (IR.KAUMS.NUHEPM.REC.1399.067). The participants signed the informed consent form in all stages of the study.



**Graph 1:** Scree plot of the Online Health Information-Seeking Skill Scale in middle-aged people

## RESULTS

The mean age of the middle-aged participants was  $44.1 \pm 7.38$  years and the average time of using the Internet was  $26.14 \pm 20.1$  h/week. Of the 430 participants, 254 (59%) were female, 349 (81.2%) were married, and 182 (42.3%) were bachelors [Table 1]. The 24 remaining items from the previous stage entered this stage. KMO test showed the adequacy of the sample size for exploratory factor analysis (0.94). Bartlett's test of sphericity was also significant (Chi-square = 4563.965,  $P < 0.001$ ) indicating a sufficient correlation between the variables [Table 2]. Factor analysis with the minimum eigenvalue  $>1$ , after varimax rotation, showed the extract of 20 items within 3 factors. Factors 1–3 explained 58.64% of the total variance [Table 3]. Factor loading of the items ranged from 0.48 to 0.81. Considering the concepts inferred from the items loaded in each factor, the first factor with 11 items was called "information reception." The second factor was named "provide and exchange information," which contained 6 items. The third factor with 3 items was referred to as "identification and trust" [Table 4]. Cronbach's alpha total scale was 0.93. The ICC tools and their subscales were calculated with the two-way mixed model of the absolute agreement type, which with 95% confidence, the coefficients were between 0.75 and 0.86 [Table 4].

## DISCUSSION

In this study, the steps taken for the development and psychometrics of the OHI-SSS were documented according to a valid guideline.<sup>[22]</sup> The exploratory factor analysis extracted three subscales in OHI-SSS: (1) information reception, (2) provide and exchange information, and (3) identification and trust. Studies have shown that the rate of Internet use depends significantly on a person's skill.<sup>[23]</sup> Therefore, the study of users' skills to use health information online should be considered by health-care providers.

The first subscale identified in OHI-SSS was information reception. The subscale items reflect middle-aged people's capabilities in receiving health information by using different websites. The Internet has facilitated access to health information for all,<sup>[24,25]</sup> and many people use it as the first source of information due to limited consultation time of doctors and barriers to professional health service access. While, for some people, it may be considered a supplement to health care.<sup>[25]</sup>

The second subscale measured the middle-aged people's skills in sharing their health experiences, interacting with other users, completing the online satisfaction forms related to the provided care, and engagement in health decision-making strategies. The items measured by this subscale are important issues that almost imply the user's abilities, experiences, and self-efficacy.<sup>[1]</sup> This subscale represents the potential of the Internet in offering support to a large group of online health information users.<sup>[25]</sup> The Internet allows people to

**Table 1: The participants' characteristics to evaluate the construct validity**

Variable	n (%)	Mean±SD <sup>a</sup>	P	
Sex*				
Male	178 (40.9)	68.38±15.06	0.22	
Female	256 (59.1)	70.33±16.92		
Education**				
Under diploma	42 (9.7)	53.16±22.3	0	
Diploma	117 (26.9)	69.97±14.46		
Bachelor	182 (41.8)	69.97±14.49		
Master and high	94 (21.6)	75.43±13.34		
Employment status**				
Not in paid employment	123 (28.3)	69.61±19.19	0.6	
Employed	201 (46.2)	69.4±13.46		
Self-employed	111 (25.5)	69.97±17.22		
Marital status*				
Married	351 (80.7)	69.14±0.86	0.6	
Single	84 (19.3)	70.35±1.8		
Economic satisfaction*				
Satisfied	206 (47.4)	69.4±14.99	0.87	
Dissatisfied	229 (52.6)	69.65±17.24		
Variable	Mean±SD	Range	r <sup>b</sup>	P
Work experience	19.02±9.5	1-40	-0.23	0
Internet usage (hours per week)	26.14±20.19	1-80	-0.03	0.87
Age	49.03±7.38	40-65	-0.29	0

Statistical tests used for study variables: \*Independent-samples *t*-test, \*\*One-way analysis of variance, <sup>a</sup>Mean±SD of online health information-seeking skill, <sup>b</sup>Pearson correlation coefficient. SD: Standard deviation

**Table 2: Bartlett spherical test and Kaiser–Meyer–Olkin**

KMO test		Bartlett spherical test	
Sample adequacy	P	Degree of freedom	$\chi^2$
0.941	0.000	190	4563.965

KMO: Kaiser–Meyer–Olkin

communicate with health professionals as well as share their health experiences with other users.<sup>[26]</sup>

The final OHI-SSS subscale was the identification of useful online health information and trusting them. This subscale measures the skill of a middle-aged individual in identifying reliable websites of health information. Identification of health-care professionals such as specialist doctors by using reliable websites to succeed in managing one's health can be linked to the self-efficacy of individuals.<sup>[27]</sup> Online health information from unqualified websites may lead to inadequate treatment or delays in receiving health care.<sup>[28]</sup> It is, therefore, significant to devise ways for helping individuals to select valid, useful, and informative information. Health professionals may consider ways to introduce web-based health information to people.

The strength of the present scale is that, unlike other available tools, the generation of the item is based on the direct users' views, and literature review has contributed to its comprehensiveness. Despite the emergence of communication technologies and the availability of

information, the use of health information is not ensured.<sup>[29]</sup> Multiple cultural and socioeconomic factors influence the extent of users utilizing online health information. Improving the delivery of health-related information necessitates a thorough understanding of users' needs. This scale provides basic knowledge about skills of related seeking online health information to policymakers so that they can make the necessary interventions. Since the respondents in this study were recruited from middle-aged people, the findings should be generalized cautiously, because the skill of using online health information varies in different age groups. The authors did not test the relationship between observed variables and their underlying structures. The authors suggest that the study be conducted for this purpose by other researchers.

## CONCLUSION

The results of this study indicated that the reliability and validity of OHI-SSS are acceptable. The Internet is an easily available source of health information, but it may create inequalities in health information accessibility among individuals who do not possess the skills of using it, especially among the elderly, those with low income, and those with low educational attainment. Therefore, there is a need to assess the skills of users, especially middle-aged people in using online health information, as this group of people will enter the stage of aging after this period, which is associated with several health challenges.



**Table 3: Extracted factors with principal component analysis method**

Items	Initial eigenvalues			Rotation sums of squared loadings		
	Total	Variance (%)	Cumulative (%)	Total	Variance (%)	Cumulative (%)
1	9.084	45.419	45.419	4.775	23.877	23.877
2	1.408	7.040	52.459	4.067	20.336	44.214
3	1.237	6.186	58.645	2.886	14.431	58.645

**Table 4: Factor analysis of the Online Health Information-Seeking Skill Scale and internal reliability**

Number of items	Questionnaire items and subscale names	Factor loading 1	Factor loading 2	Factor loading 3
<b>Subscale 1: Receiving information</b>				
12	I can search and receive the exercise and sports-related information I need via the Internet	0.809		
18	I can search and receive the information I need to prepare for medical laboratory tests via the Internet	0.748		
4	I can use the online content of health-related books, articles, or educational videos	0.629		
9	I can search for the information I need about medication and related care points	0.717		
17	I can search for the information I need about readiness for diagnostic examinations (ultrasound, CT scan, MRI ...)	0.610		
10	I can search and have access to online diet-related information	0.587		
15	Using online health information, I can find the answers to my questions	0.577		
13	I can use an online appointment booking system for clinics and doctors	0.561		
7	I can use the experiences and information other people share online	0.555		
17	I can easily understand the online health information offered on the Internet	0.516		
6	I can search for my health issues through online resources (information resources, services, or support)	0.483		
<b>Subscale 2: Providing and information exchange</b>				
23	I can fill out an online health-care provider complaint form		0.787	
20	I can report side effects and medication errors online		0.634	
21	I can make online suggestions for improving the quality of health-care services		0.726	
22	I can fill out a health-care satisfaction form online		0.711	
24	During illness, I can exchange online information about my health status with health-care providers		0.629	
19	I can share my experiences in the field of health with other online users		0.601	
<b>Subscale 3: Identification and trust</b>				
2	Having health problems, I can find the health-care provider website			0.799
1	I can find a knowledgeable and trusted doctor online			0.768
3	I can identify trusted health websites to find answers to my health questions			0.717
	Cronbach's alpha for each subscale	0.878	0.795	0.745
	ICC	0.868	0.779	0.754

ICC: Intraclass correlation coefficient, CT: Computed tomography, MRI: Magnetic resonance imaging

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## Conflicts of interest

There are no conflicts of interest.

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