


# Seniors' eHealth literacy, health and education status and personal health knowledge

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## Abstract

**Background:** The COVID-19 pandemic made eHealth literacy skills and online health activities essential for seniors.

**Research aims:** (a) To examine the differences in eHealth literacy dimensions (awareness of sources, recognizing quality and meaning, understanding information, perceived efficiency, validating information) as related to participants' health status and education level. (b) To explore the effect of eHealth literacy dimensions on participants' personal health knowledge.

**Methods:** We used a cross-sectional design with a convenience sample of 298 Israeli seniors aged 65 or over during the second lockdown. The questionnaire was composed of three sections: (a) background characteristics, (b) an eHealth Literacy scale, and (c) perceived personal health knowledge.

**Results:** Participants with an excellent health status reported higher levels of awareness of sources and perceived efficiency than participants with poor or good health statuses. Furthermore, participants with a graduate degree understand online information better than participants with a high school education. Moreover, it was found that participants with a high school education sense that they are being smart on the net more than participants with an undergraduate degree. Finally, we found that eHealth literacy dimensions influenced the participants' personal health knowledge.

**Conclusion:** As the population ages, it becomes more at risk for disease, and as a result, its health status weakens. Therefore, it is important to provide seniors with appropriate intervention programs for improving their eHealth literacy, which may eliminate health inequality. In addition, caregivers need to develop patients' eHealth literacy skills—finding, evaluation, and interpretation of online health knowledge relevant to them.

## Keywords

Electronic health literacy, seniors, personal health knowledge, health status, education

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## Introduction

The year 2020 saw the appearance of a worldwide pandemic named COVID-19,<sup>1,2</sup> influencing people's lives globally. Physical isolation was recommended, strongly affecting the social, mental, and health-related aspects of people's lives, particularly of groups at risk, such as seniors aged 65 or above. With this new situation, the Internet became a major contact channel regarding all aspects of life, even more than it had been before. The Internet offers essential knowledge and health services for patients; therefore, eHealth literacy has become more crucial than ever in this challenging time, particularly for

seniors, since it increases their welfare, quality of life, and health status.<sup>3–8</sup>

According to the World Health Organization,<sup>9</sup> eHealth refers to the use of information and communication technologies (ICT) for health-related purposes, and eHealth literacy refers to individuals' ability to make use of ICT to enhance or enable their health care.<sup>10</sup> eHealth literacy is a

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complex concept, and frequently measurement instruments used for examining it include a small number of items. Therefore, in an effort to deal with this issue, researchers revised and extended the concept of eHealth literacy, based on the original theoretical premises, addressing documented critical issues.<sup>11,12</sup> The extended eHealth literacy scale (eHEALS-E) offers six dimensions for examining eHealth literacy in a more thorough manner.<sup>11</sup> Those dimensions are awareness of sources, recognition of quality and meaning, understanding information, perceived efficiency, validation of information, and being smart on the net. Awareness of sources and perceived efficiency have been found to be the most developed dimensions and being smart on the net and understanding information the least developed.<sup>11</sup> Hence, in this study we elected to explore the extended aspect of health literacy technology as regards seniors. As far as we know, there is no research examining eHealth literacy dimensions (awareness of sources, recognition of quality and meaning, understanding information, perceived efficiency, validation of information) as regards seniors during the COVID-19 pandemic.

There are many advantages to having high-level eHealth literacy skills—they allow patients to operate well within the health care system and find better care by using online information more effectively to reduce waiting periods and improve communication with health care professionals. These issues may ultimately lead to better experiences with both technology and health.<sup>10</sup> Research has found a positive connection of eHealth literacy and joint patient–physician decision-making,<sup>13</sup> as well as clear advantages for patients’ decision-making styles.<sup>14</sup>

Advanced eHealth literacy has been associated with improved personal health status,<sup>5,6,7,15–19</sup> quality of life,<sup>3,4,20</sup> and low risk of chronic disease.<sup>10</sup> One study demonstrated that men over 65 with lower education levels have low levels of health literacy<sup>21,22</sup>; and another demonstrated that participants with a high probability of misinterpreting health information had a lower education level, lower income, and poorer health.<sup>22,23</sup> This can endanger people’s health, as patients with lower education levels have significantly lower probabilities of going online to follow-up on their own health information,<sup>24</sup> and rarely browse the Internet,<sup>23</sup> thus they lose the benefits inherent in eHealth usage. Accordingly, it is necessary to evaluate patients’ eHealth literacy and recognize any inherent problems, guaranteeing their access to eHealth resources.<sup>25</sup>

Moreover, research shows that eHealth literacy allows us to place health research findings in their proper context, thus gaining insight into the research processes involved in knowledge generation.<sup>26</sup> Other studies show that Internet-advised patients may be able to obtain both knowledge and therapy options to choose from before they contact practitioners, which makes them better able to take a deeper and more involved role in decision making.<sup>14</sup> It is worth mentioning that the Internet has

extensive, easily available information, but the reliability and precision of that information are difficult to evaluate.<sup>27</sup> This is extremely challenging, as most online health-related information seekers believe all or most information they find on the Internet, and do not carefully assess the sources the websites in question rely on.<sup>28,29</sup> During the COVID-19 pandemic, this is even more important than previously.

Although Internet use for seniors over 65 is more common than previously, they are still a relatively helpless population since the use of the Internet for examination of health-related information is continuously increasing.<sup>30</sup> Furthermore, with the appropriate engagement of eHealth literacy, it has been found to be an adjustable factor even in 50–60 year olds.<sup>31</sup> In the present (COVID-19 focused) time, online health-related activities and eHealth literacy have become a necessity, particularly for seniors.

Based on the above, the study strives to examine two main issues among seniors during the COVID-19 pandemic period:

1. To examine the differences in eHealth literacy dimensions (awareness of sources, recognizing quality and meaning, understanding information, perceived efficiency, validating information) as related to participants’ health status and education level.
2. To explore the effect of eHealth literacy dimensions (awareness of sources, recognizing quality and meaning, understanding information, perceived efficiency, validating information) on participants’ personal health knowledge.

Accordingly, the following research questions are addressed:

1. What are the differences in eHealth literacy dimensions (awareness of sources, recognizing quality and meaning, understanding information, perceived efficiency, validating information) as related to participants’ health status and education level?
2. What is the effect of eHealth literacy dimensions (awareness of sources, recognizing quality and meaning, understanding information, perceived efficiency, validating information) on participants’ personal health knowledge?

## Methods

### Cross-sectional design

**Participants and procedure.** The convenience sample consisted of 298 Israeli seniors aged 65 or above. During the second lockdown after the outbreak of COVID-19 in Israel, we sent a message with contact information regarding participation in the study via social networks and

WhatsApp groups. Those interested were referred to a link to read about the research objectives and other details and given the possibility of withdrawing from the study at any time. People wishing to answer the questionnaire were asked to sign an informed consent form electronically and were then directed to the questionnaire which took about 10 min to complete. The message was sent to 1213 potential participants, and 298 expressed interest and took part in the study. The overall response rate for study attendance was 25%, considered an adequate response rate.

**Measures.** In order to measure participants' health status, education level, eHealth literacy dimensions, and perceived personal health knowledge, the questionnaire was composed of three sections: *the first section* related to background characteristics, for example, health status, age, and current diseases. *The second section* referred to eHealth literacy and was based on a revised and extended eHealth literacy scale (eHEALS). The eHEALS originally included only eight to 10 items (Norman and Skinner, 2006a)<sup>12</sup>, referring to the ability to search, find and understand health information from electronic sources, assess the quality of the information, and apply it in order to address or solve a given health problem (Norman and Skinner, 2006b)<sup>32</sup>. In this study, eHealth literacy was examined in the context of general and non-personal health information existing as free knowledge on the Internet, unrelated to the participants' personal health care. eHEALS-E includes six dimensions: (a) **awareness of sources** (three items), for example: "I know where to find helpful health resources on the Internet," internal consistency 0.84 (Cronbach's alpha); (b) **recognizing quality and meaning** (three items), for example: "I can easily extract the essential meaning of some health information on the Internet," internal consistency 0.87 (Cronbach's alpha); (c) **understanding information** (four items), for example: "I can easily extract the essential meaning of some health information on the Internet," internal consistency 0.31 (Cronbach's alpha), and after deleting one item it became 0.66; (d) **perceived efficiency** (four items), for example: "I feel confident using information from the Internet to make successful health decisions," internal consistency 0.34 (Cronbach's alpha), and after deleting one item it became 0.79; (e) **validating information** (three items), for example: "I feel confident using information from the Internet to make successful health decisions," internal consistency 0.53 (Cronbach's alpha), and after deleting one item it became 0.60; and (f) **being smart on the net** (three items), for example: "I think that most of the health information we find on the Internet can be trusted (reversed item)," internal consistency 0.55 (Cronbach's alpha), and after deleting one item it became 0.65. The scale used a 5-point Likert-like scale ranging from 1 ("completely disagree") to 5 ("completely agree").<sup>11</sup> Due to deletion of the items from some of the categories we performed

expletory factor analysis for the remaining items, as presented in Table 1.

As Table 1 shows, the factor analysis merged the "awareness of sources" and "recognizing quality and meaning" categories (fac 1), as well as the "being smart on the Net" and "perceived efficiency" categories (fac2). Nevertheless, we decided to stay with the original questionnaire and keep them as four separate factors—"awareness of sources," "recognizing quality and meaning," "being smart on the Net," and "perceived efficiency." The other factors were "understanding information" (fac3) and "validating information" (fac4).

*The third section* referred to perceived personal health knowledge. Health knowledge refers to facts, information and skills learnt through involvement or learning, as well as the understanding of issues associated with health.<sup>33</sup> Therefore, in this study, "perceived personal health knowledge" refers to the participant's perception of information and skills regarding his/her own health, with the comprehension of these issues acquired through interacting, mostly face to face, with health care professionals. This knowledge consisted of four items composed by the author, for example: "I understand information while interacting with health care professionals regarding my own health issues." The internal consistency of this sub-category was 0.83 (Cronbach's alpha). The scale used a 5-point Likert-like scale ranging from 1 ("completely disagree") to 5 ("completely agree").

The questionnaire was translated from English to Hebrew and vice versa and validated.

**Data analysis.** Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS TM), 21.0 version. The analyses used were Cronbach's alpha, descriptive statistics, correlations, one-way MANOVA, and multiple stepwise regression.

**Ethical considerations.** The University Institutional Review Board (IRB) approved this study. The participants were recruited voluntarily, informed regarding the research aims, and signed an informed consent form. Their answers were kept confidential, and the questionnaires were examined anonymously.

## Results

The participants' mean age was 68 ( $SD = 1.73$ ). The youngest participant was 65 years old and the oldest 71 years old. For frequency and percentage of other background, characteristics are shown in Table 2.

Table 2 shows that the majority of participants were female and the minority male. In addition, most of them were married, and secular Jews. The majority had a post-high school education. Most of the participants had one

**Table 1.** Exploratory factor analysis of the extended eHealth literacy scale (eHEALS-E).

| Scale items   | <sup>a</sup> Fac1 | <sup>a</sup> Fac2 | <sup>a</sup> Fac3 | <sup>a</sup> Fac4 |
|---|-------------------|-------------------|-------------------|-------------------|
| I know what health resources are available on the Internet.   | 0.78              |                   |                   |                   |
| I know where to find helpful health resources on the Internet.  | 0.86              |                   |                   |                   |
| I know how to use the Internet to answer health-related questions.  | 0.75              |                   |                   |                   |
| I have the skills I need to evaluate the health resources I find on the Internet.   | 0.82              |                   |                   |                   |
| I can tell high-quality from low-quality health resources on the Internet.  | 0.75              |                   |                   |                   |
| I can easily extract the essential meaning of some health information on the Internet.  | 0.77              |                   |                   |                   |
| I feel confident using information from the Internet regarding health.  |                   | 0.51              |                   |                   |
| The Internet helps to see decisions about health clearer easily.  |                   | 0.43              |                   |                   |
| It is important to be able to access health-related information online.   |                   | 0.45              |                   |                   |
| I think that most of the health information we find on the Internet can be trusted (R).   |                   | 0.8               |                   |                   |
| I am satisfied with the first health resource on the Internet that offers answers to my questions (R).  |                   | 0.74              |                   |                   |
| Considering all health information on the Internet, I sometimes find it difficult to select the most relevant health information.                   |                   |                   | 0.78              |                   |
| The huge quantity of health information available on the Internet usually confuses me.  |                   |                   | 0.82              |                   |
| Sometimes, when I have questions regarding a health issue, I am not sure where to start searching for information on the Internet.                  |                   |                   | 0.64              |                   |
| If I do not understand health information on the Internet, I would rather ask somebody for an explanation before coming to conclusions.             |                   |                   |                   | 0.8               |
| It is important to me to check health information that I find on the Internet with other resources (such as doctors, books, friends, or relatives). |                   |                   |                   | 0.79              |
| Eigenvalue  | 5.99              | 2.14              | 1.39              | 1.07              |

<sup>a</sup>Fac1 corresponds to the factors “awareness of sources” and “recognizing quality and meaning,” Fac2 to “being smart on the Net” and “perceived efficiency,” Fac4 to “understanding information,” Fac5 to “validating information.”

or more chronic diseases, and their health status was considered to be at a good level.

In order to examine the first half of the first research question—“To examine the differences in eHealth literacy dimensions (awareness of sources, recognizing quality and meaning, understanding information, perceived efficiency, validating information) as related to participants’ health status, we performed a one-way multivariate analysis (MANOVA). This analysis found a significant difference among levels of health status regarding eHealth literacy dimensions ( $F(12,580) = 2.59, p < 0.03, \eta^2 = 0.03$ ). For follow-up, univariate ANOVAs conducted for differences of eHealth literacy dimensions between levels of health status are shown in Table 3.”

Table 3 shows a significant difference between poor, good, and excellent health statuses, in the “awareness of sources” and “perceived efficiency” dimensions. A post-hoc Scheffe test demonstrated that participants with an excellent health status reported higher levels of “awareness of online sources” than those with good health status. Moreover, participants with an excellent health status perceived “efficiency of online health information” as higher than those with good health statuses. In the other dimensions, no significant differences were found among health status levels.

In order to examine the second half of the first research question—“To examine the differences in eHealth literacy dimensions (awareness of sources, recognizing quality

**Table 2.** Frequency and percentage of background characteristics.

| Background characteristics |                            | F (%)      |
|----------------------------|----------------------------|------------|
| Gender                     | Male                       | 133 (45)   |
|                            | Female                     | 165 (55)   |
| Status                     | Single                     | 5 (2)      |
|                            | Married                    | 231 (77)   |
|                            | Divorced                   | 38 (12)    |
|                            | Widowed                    | 24 (9)     |
| Religious                  | Jewish                     | 297 (99.7) |
|                            | Muslim                     | 1 (0.3)    |
| Religiosity                | Secular                    | 201 (67)   |
|                            | Traditional                | 67 (23)    |
|                            | Religious                  | 27 (9)     |
|                            | Very religious             | 3 (1)      |
| Education                  | High school                | 67 (25)    |
|                            | Post-high school Education | 103 (34)   |
|                            | Undergraduate              | 87 (29)    |
|                            | Graduate                   | 41 (14)    |
| Comorbidities              | 0                          | 136 (45.6) |
|                            | 1                          | 86 (28.9)  |
|                            | 2                          | 44 (14.8)  |
|                            | 3 +                        | 30 (10)    |
| Health status              | Poor                       | 28 (10)    |
|                            | Good                       | 186 (62)   |
|                            | Excellent                  | 84 (29)    |

and meaning, understanding information, perceived efficiency, validating information) as related to participants' education level, we performed a one-way multivariate analysis (MANOVA)."

This analysis found a significant difference among education levels regarding eHealth literacy dimensions ( $F(18,817) = 2.30, p < 0.01, \eta^2 = 0.05$ ). For follow-up, univariate ANOVAs conducted for differences of eHealth literacy dimensions between education levels.

For differences among education, levels are shown in Table 4.

Table 4 shows the significant differences between education levels in the "understanding information" and "being smart on the net" dimensions. A post hoc Scheffe test demonstrated that participants with a high school education reported understanding online information more than those with a graduate or undergraduate education. Moreover, participants with a high school education reported a higher average of that being smart on the net than those with undergraduate education. In the other dimensions, no significant differences were found among education levels.

In order to examine the second research aim, "To explore the influence of eHealth Literacy dimensions (awareness of sources, recognizing quality and meaning, understanding information, perceived efficiency, validating information) on personal health knowledge," we first conducted Pearson correlations for detecting relations among variables, followed by a multiple regression stepwise analysis between variables for influences, as described in Table 5.

Table 5 shows that significant relationships were found between personal health knowledge and the eHealth Literacy dimensions of "awareness of sources," "recognizing quality and meaning," "perceived efficiency," "validating information," and "being smart on the net," but not with "understanding information."

The stepwise analysis regression shows that personal health knowledge can be explained based on the eHealth literacy dimensions of "perceived efficiency," "validating information," "awareness of sources," and "understanding information" ( $F(4293) = 93.39, p < 0.00$ ). The predictive variables explained 56% of the variance of the total perceived outcomes of perceived personal health knowledge. The regression analysis results are described in Table 6.

As Table 6 shows, the stepwise analysis includes most of the e-Health dimensions. The most significant variable explaining the variance of personal health knowledge was "perceived efficiency," followed by "validating information," "awareness of sources," and finally, "understanding information." The other dimensions were removed from the model by the stepwise analysis.

## Discussion

The present study strives to examine two main issues among seniors during the COVID-19 pandemic: first, the differences among participants' eHealth literacy dimensions (awareness of sources, recognizing quality and meaning, understanding information, perceived efficiency, validating information) as related to their health status and education level; and second, the effect of eHealth Literacy dimensions (awareness of sources, recognizing quality and meaning, understanding information, perceived

**Table 3.** Differences of eHealth literacy dimensions among health status levels.

| eHealth Literacy dimensions     | Poor <i>N</i> = 28 |           | Good <i>N</i> = 186 |           | Excellent <i>N</i> = 84 |           | <i>F</i> (2295) | $\eta^2_p$ |
|---------------------------------|--------------------|-----------|---------------------|-----------|-------------------------|-----------|-----------------|------------|
|                                 | <i>M</i>           | <i>SD</i> | <i>M</i>            | <i>SD</i> | <i>M</i>                | <i>SD</i> |                 |            |
| Awareness of sources            | 3.65               | .75       | 3.52                | .87       | 3.85                    | 0.99      | 3.19*           | 0.03       |
| Recognizing quality and meaning | 3.33               | .92       | 3.44                | .95       | 3.7                     | .97       | 2.65            | 0.02       |
| Understanding information       | 2.95               | .89       | 3.06                | .83       | 2.89                    | .91       | 2.14            | 0.01       |
| Perceived efficiency            | 3.23               | .96       | 3.28                | .89       | 3.68                    | .88       | 6.38**          | 0.04       |
| Validating information          | 4.10               | .83       | 3.85                | .94       | 4.03                    | .86       | 1.72            | 0.01       |
| Being smart on the net          | 2.46               | .92       | 2.71                | .85       | 2.85                    | .97       | 2.10            | 0.01       |

\**p* < 0.05; \*\* *p* < 0.00.

**Table 4.** Differences of eHealth literacy dimensions among education levels.

| eHealth Literacy dimensions        | High school<br>( <i>N</i> = 67) |           | Post high<br>school<br>( <i>N</i> = 103) |           | Undergraduate<br>( <i>N</i> = 87) |           | Graduate<br>( <i>N</i> = 41) |           | <i>F</i> (3294) | $\eta^2$ |
|------------------------------------|---------------------------------|-----------|--|-----------|-----------------------------------|-----------|------------------------------|-----------|-----------------|----------|
|                                    | <i>M</i>                        | <i>SD</i> | <i>M</i>                                 | <i>SD</i> | <i>M</i>                          | <i>SD</i> | <i>M</i>                     | <i>SD</i> |                 |          |
| Awareness of sources               | 3.62                            | .95       | 3.64                                     | .97       | 3.55                              | .86       | 3.73                         | .76       | .035            | 0.01     |
| Recognizing quality<br>and meaning | 3.41                            | 1.0       | 3.53                                     | 1.0       | 3.49                              | .93       | 3.6                          | .76       | 0.34            | 0.03     |
| Understanding<br>information       | 3.24                            | .83       | 3.09                                     | .88       | 2.83                              | .79       | 2.76                         | .87       | 4.45*           | 0.04     |
| Perceived efficiency               | 3.36                            | .79       | 3.52                                     | .89       | 3.45                              | .81       | 3.62                         | .66       | 1.02            | 0.01     |
| Validating information             | 4.1                             | .88       | 4.06                                     | .81       | 3.75                              | 1.0       | 3.87                         | .97       | 2.51            | 0.03     |
| Being smart on the net             | 3.02                            | 1.0       | 2.67                                     | .90       | 2.56                              | .84       | 2.73                         | .71       | 3.68*           | 0.03     |

\**p* < 0.05; \*\* *p* < 0.00.

efficiency, validating information) on their personal health knowledge.

First, participants with an excellent health status report higher levels of eHealth literacy in the dimension of ‘awareness of online health sources’ than those with good health status. Moreover, participants with an excellent health status report higher levels of eHealth literacy in the dimension of ‘perceived efficiency of accessing and searching for online health information’ than those with good health status. The Findings regarding the association between eHealth literacy and health status in the research literature are inconsistent. Similarly, to our findings, other researchers reported that people with deficient health literacy had a more inferior health status than those with good health literacy.<sup>19</sup> This can be explained in that individuals with

insufficient health literacy receive no assistance, and thus their health condition deteriorates.<sup>34</sup> Dissimilar to our results, another study found that one’s health status was not associated with high eHealth literacy.<sup>35</sup> In general, the literature has found that health status is directly related to general digital technology use.<sup>16–18</sup> Since eHealth literacy is the ability to seek out, assess and use health-related information on the Internet in order to find a solution to health problems, eHealth literacy is considered an important factor for preserving a healthy lifestyle and high-level health status,<sup>36</sup> particularly for seniors.

In addition, the results demonstrate that participants with a high school education level have a higher level of “understanding online information” (an eHealth literacy dimension) than those with a graduate or undergraduate

**Table 5.** Pearson correlations of eHealth literacy dimensions and personal health knowledge.

| Variables                           | (1) | (2)   | (3)   | (4)   | (5)     | (6)   | (7)   |
|-------------------------------------|-----|-------|-------|-------|---------|-------|-------|
| (1) Awareness of sources            | 1   | .74** | .28** | .61** | .24**   | .34** | .57** |
| (2) Recognizing quality and meaning |     | 1     | .40** | .61** | .09     | .35** | .48** |
| (3) Understanding information       |     |       | 1     | .28** | −0.16** | .04   | −0.02 |
| (4) Perceived efficiency            |     |       |       | 1     | .21**   | .48** | .67** |
| (5) Validating information          |     |       |       |       | 1       | .08   | .34** |
| (6) Being smart on the Net          |     |       |       |       |         | 1     | .4**  |
| (7) Personal health knowledge       |     |       |       |       |         |       | 1     |

\* $p < 0.05$ ; \*\*  $p < 0.00$ .

**Table 6.** Multiple regression stepwise type analysis test for predicting personal health knowledge.

|                           | <i>B</i> | $\beta$ | <i>t</i> | <i>R</i> <sup>2</sup> |
|---------------------------|----------|---------|----------|-----------------------|
| Model                     |          |         |          | 0.56                  |
| Perceived efficiency      | 0.56     | 0.53    | 10.78    |                       |
| Validating information    | 0.12     | 0.13    | 3.136    |                       |
| Awareness of sources      | 0.26     | 0.27    | 5.42     |                       |
| Understanding information | −0.24    | −0.22   | −5.20    |                       |

\* $p < 0.01$ ; \*\*  $p < 0.00$ .

education level. This is inconsistent with the current research literature, which shows that educational level is associated with health literacy levels.<sup>22</sup> Moreover, surprisingly, it was found that participants with a high school education level sense that they are being smart on the Net (an eHealth literacy dimension) more than those with undergraduate education. Education level was also associated with health literacy in Europe; however, not in a study conducted with Japanese participants.<sup>37</sup> Specifically, in America people with higher education levels demonstrate higher levels of health literacy.<sup>38</sup> Perhaps this in consist findings depends on the geographical area, culture, or country in question. Moreover, during these COVID-19 times, it is important that people, regardless of their education level, have good eHealth literacy, namely, seek out, assess and use health-related information for discovering better health solutions,<sup>36</sup> since the Internet is the main venue for fulfilling their health-related needs.

Second, it was found that the eHealth literacy dimensions of “perceived efficiency,” “validating information,” “awareness of sources,” and “understanding information”

influenced and explained personal health knowledge. Former studies have examined the relations of different measures to personal health knowledge. One study found that general health knowledge and attitudes are connected to eHealth literacy.<sup>35</sup> Another study demonstrated that searching for health knowledge and social networking influence participants’ e-health literacy. Yet another study has shown that searching for health knowledge influences e-health literacy.<sup>37</sup> All these studies are related to this aim. However, after a broad review of the contemporary research literature, we did not find research with an in-depth analysis aimed at detecting the influence of eHealth literacy dimensions (awareness of sources, recognizing quality and meaning, understanding information, perceived efficiency, validating information) on personal health knowledge among seniors during the COVID-19 pandemic.

## Conclusions

First, participants with an excellent health status report a higher level of eHealth literacy dimensions (“awareness of sources” and “perceived efficiency”) than those with good health status. It should be noted that as populations age, they are more at risk for disease due to their deteriorating health status. Therefore, it is important to provide them with appropriate intervention programs for improving their eHealth literacy, oriented towards “awareness of sources” and highlighting the advantage of retrieving reliable health information. That is, intervention programs that are adapted and tailored to seniors’ health statuses, characterized by chronic health problems, through the use of existing technologies.

Second, participants with a high school education level have a higher level of understanding of online information (an eHealth literacy dimension) than those with a graduate

or undergraduate education level. Moreover, it was found that participants with a high school education level feel that they are being smart on the net (an eHealth literacy dimension) more than those with undergraduate education. Access to the Internet through a variety of technological devices, such as smartphones, tablets, and computers, bridges the differences in education, and participants with a high school education feel that they have a higher level of understanding of online information and are being smarter on the net than participants with higher education levels. It is important to provide the entire elderly population with appropriate educational intervention programs for enhancing the eHealth literacy dimension, as understanding online information and being smart on the Net is also needed by populations with a high education level.

Third, it was found that eHealth literacy dimensions both influence and explain personal health knowledge. However, it is worth mentioning that people with low eHealth literacy skills can select health information for reasons of convenience rather than accuracy or authority. Future caregivers need to develop patients' eHealth literacy skills for the purpose of finding, evaluating, and interpreting online health information accurately.

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