

Do elders care about eHealth? A correlational study between eHealth consumption and literacy

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SUMMARY

As digital tools become more prevalent in medicine, the ability for individuals to understand and take actions based on what they read on the internet is crucial. eHealth literacy is defined as the ability to seek, find, understand, and evaluate health information from electronic sources and apply the knowledge gained to addressing or solving a health problem. In general, Americans have low eHealth literacy rates. However, limited research has been conducted to understand the eHealth literacy level among older Chinese adult immigrants in the U.S. To determine the eHealth literacy of elderly Chinese immigrants, we sent out an eHealth survey and relevant computer skills survey using a modified version of the eHEALS (eHealth Literacy Scale) health literacy test. We hypothesized that elders who consumed more electronic health content would have a higher eHealth literacy score. The results of this survey showed that there was a positive correlation between the frequency of electronic health information consumption and the participant's eHealth literacy rate. In addition, the results of our computer literacy test show that the frequency of consumption and computer literacy are positively correlated as well. There is a strong positive correlation between the level of computer skills and eHealth literacy of participants. These results reveal possible steps individuals can take to reduce health misinformation and improve their own health by attaining, understanding, and taking action on health material on the internet.

INTRODUCTION

Public health is extremely important, especially in the wake of the COVID-19 pandemic. One important part of public health is the aspect of health literacy and electronic health (eHealth) literacy as more and more information is migrating to digital sources and many doctors' offices have adopted electronic communication. The CDC has supported Dr. Cameron Norman, an adjunct professor at the University of Toronto and eHealth literacy activist, with his definition of eHealth literacy as the ability to seek, find, understand, and evaluate health information from electronic sources and apply the knowledge gained to addressing or solving a health problem (1). The differentiation between health literacy and eHealth literacy is crucial to make as eHealth literacy has the added component of adequate computer skills. Monkman and colleagues found that when using the eHealth Literacy Scale (eHEALS) to assess literacy, health literacy and

eHealth literacy were dissimilar (2). There are several eHealth literacy surveys available on the internet, but we chose to use a modified version of the eHEALS survey because of its accuracy and consistency. eHEALS is a validated eight-item Likert scaled questionnaire used to assess self-reported capability of eHealth consumers. Numerous studies have found that eHEALS was the most reliable tool when measuring eHealth literacy. Dr. Norman found that eHEALS reliably and consistently captures eHealth literacy concept and shows promise as a tool for assessing familiarity and skill in using technology for health purposes (3). The eHEALS is based on an individual's perception of their own skills and knowledge for each item, therefore it is not directly comparable to literacy measures calculated by overall health literacy tests. The idea that computer skills play some role in eHealth literacy is shown in Cameron Norman's research where he found that the six core skills to eHealth literacy are traditional literacy, health literacy, information literacy, scientific literacy, media literacy, and computer literacy (Norman and Skinner).

Problems in public health remain as people across the country face lack electronic health literacy and face difficulty accessing and understanding health information. This was extremely prevalent during the COVID-19 pandemic as inaccurate, blatantly incorrect, or dangerous information was being spread on the internet, such as information claiming that swallowing bleach, spraying alcohol and chlorine all over the body, and taking antibiotics were effective antiviral treatments (4). Critical components of health literacy that need to be assessed include communications, comprehension, numeracy, navigation, health information seeking, decision making, and need for assistance (5). When considering telemedicine services alone, nearly thirteen million older adults have trouble accessing those services (6). However, even when individuals have access to health information, it is not always beneficial. When looking at the United States, despite the importance of health and eHealth literacy, 9 out of every 10 adults in the U.S. lack the skills necessary to manage their own health and prevent disease (7).

When considering the geriatric population, health literacy levels among elderly people are generally lower than middle aged adults. This may be because most medical information is written above the reading level of many elderly people (8). The National Assessment of Adult Literacy found that when considering health literacy instead of eHealth literacy, 71% of adults older than age 60 had difficulty in using print materials, 80% had difficulty using documents such as forms or charts, and 68% had difficulty with interpreting numbers and doing calculations (9). In addition, inadequate computer skills also contribute to a lower eHealth literacy rate. Only a slight majority of older adults surveyed (53%) use the internet, and more than a quarter (28%) do not own an electronic device.

Low health literacy had far-reaching negative effects. A study conducted by Binh Bo and colleagues found that when analyzing elders with suspected COVID-19 symptoms, a one-score increment of health literacy was associated with an 8% higher healthy eating likelihood, a 4% higher physical activity likelihood, and a 9% lower depression likelihood (10). People with higher health literacy were less likely to experience depression and had healthier behaviors overall.

eHealth literacy can be even further narrowed down by ethnicity and culture. Immigrants and non-native English speakers' number 85.7 million people, or 26% of the US population (11). For migrants, translated culturally relevant health information is extremely important for increased health literacy. This is supported by Uliana Kostareva who found that immigrants usually have low health literacy. The results for former Soviet Union and Arab immigrants indicate problematic health literacy (12). Melissa Simon supports this conclusion when researching a cohort of community-dwelling Chinese older adults, 95% of whom did not speak or read English. Her research indicates that when health literacy was tested in Chinese using the REALM-R test, the average test score was 6.9, indicating reasonable health literacy in Chinese (3). This study highlights the importance of translated medical information.

Little research has been conducted on the Chinese elderly specifically but considering how the Chinese population makes up 24% of the entire Asian American population with at least 5.4 million individuals residing in America it is important to consider this demographic as well (14). The population of Chinese immigrants in the United States has grown nearly seven-fold since 1980, reaching almost 2.5 million in 2018, or 5.5 percent of the overall immigrant population. Thus, our research investigated the hypothesis that Chinese elders who consumed more electronic health content would have a higher eHealth literacy score. We found that there is positive correlations between self-reported eHealth consumption and eHealth literacy rates, eHealth consumption and computer literacy rates, as well as between computer skills and eHealth literacy rates. These findings represent insights to how individuals can improve their eHealth literacy to better appraise and take action on online health information.

RESULTS

This study looks at potential factors that may contribute to the eHealth literacy rate of Chinese immigrants aged 60–80 years, and whether a correlation exists between the frequency of eHealth consumption and their eHealth literacy rate using surveys which were provided to participants in their native language (Chinese).

The results illustrate that the health literacy rates decrease in the elderly for several reasons. A preliminary examination of the data showed that, on average, elderly Chinese immigrants had below-average eHealth literacy rates. Out of the 41 initial surveys that were conducted, 7 either failed to complete the entire survey or revoked their consent. The remaining 34 participants had an average eHEALS score of 22.8, and only two of the 34 participants had consumed eHealth content more than 20 times (Figure 1). We aimed to test whether the number of times an individual consumed health information online impacted their eHealth literacy rate. There was a positive correlation between the frequency of eHealth consumption and eHEALS score ($r(32)=0.564$,

Frequency of Consumption vs eHEALS Score

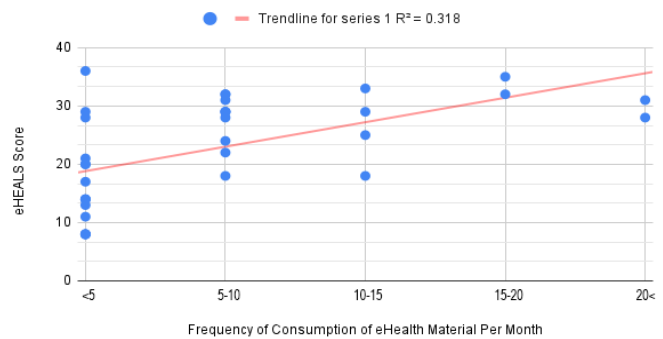


Figure 1: Correlation between frequency of consumption of eHealth material per month and eHealth literacy score. Plot shows the relationship between the frequency of consumption of eHealth material per month (x-axis) and participant's eHEALS score (y-axis). The red line is the line of best fit for the data which represents that individuals who consume more eHealth material have higher eHEALS scores.

$p=0.287$). Those who saw eHealth content fewer than 5 times the previous month had lower health literacy than those who saw eHealth content more than 20 times in the past six months.

Computer literacy and the participant's eHealth literacy score were positively correlated as well ($r(32)=0.6126$, $p=0.287$) (Figure 2). The average of the 34 total responses was 12.6, indicating a below-average skill rate. When looking at the survey responses, the lowest scoring question asked participants to rate their own computer literacy skills using a 5-point Likert scale. The most common answer participants gave was that their skills were "not that good" indicating that participants are aware of their low computer skills.

Lastly, we observed a strong positive correlation between participants' eHealth literacy score and computer literacy score ($r(32) = 0.7218$, $p= 0.287$) (Figure 3). This signifies that the ability of elderly immigrants to use a computer is a great preliminary indicator of their ability to understand health

Frequency of Consumption vs. Computer Skills Literacy

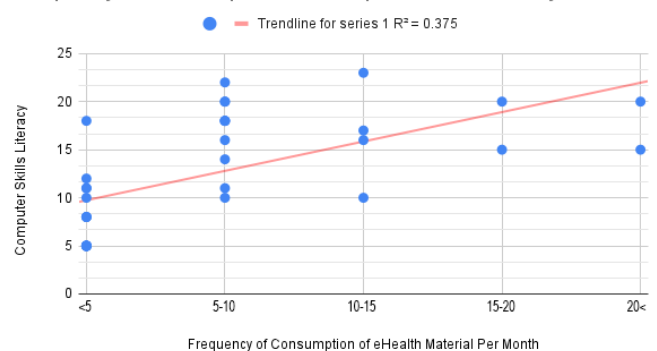


Figure 2: Correlation between frequency of consumption of eHealth material per month and computer skills literacy. Plot shows the relationship between the frequency of consumption of eHealth material per month (x-axis) and participant's computer skills literacy score (y-axis). The red line is the line of best fit for the data which represents that individuals who consume more eHealth material are more comfortable with using the computer.

eHealth score vs. Computer Literacy Score

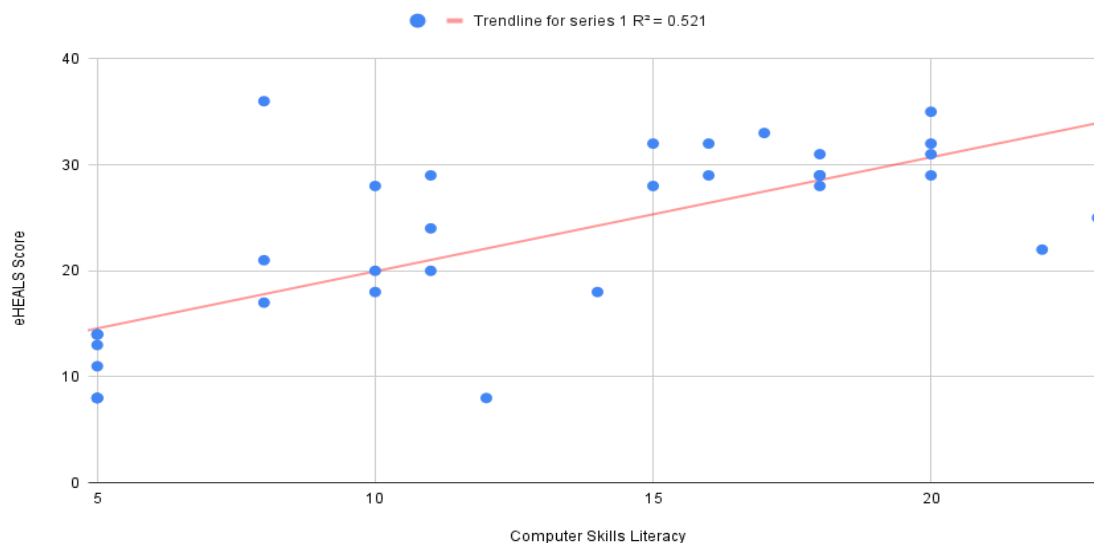


Figure 3: Correlation between computer skills literacy and eHealth literacy score. Plot shows the relationship between the frequency of consumption of computer skills literacy (x-axis) and participant’s eHEALS score (y-axis). The red line is the line of best fit for the data which represents that individuals who are more comfortable with their computers have higher eHEALS scores. Pearson’s correlation was conducted ($R^2 = 0.521$).

information online as well.

Overall, based on the results from my survey there is positive correlations between eHealth consumption and both computer literacy and eHealth literacy rates. Additionally, there is a strong positive correlation between eHealth literacy score and computer literacy score indicating that these two factors may be linked.

DISCUSSION

After analyzing our results, we observed a significant correlation between all the variables identified in the survey: frequency of consumption, computer skills, and eHealth literacy. Our research affirms what other researchers found in that health literacy levels are generally lower in geriatric populations, likely due to a lack of computer skills (15). Our research also found that there is a positive correlation between the frequency of electronic health information consumption and the participant’s eHealth literacy rate. By examining the trends in the data, we concluded that people who encounter more health information also have higher health literacy rates. This identifies another reason for the low eHealth literacy rates among elderly Chinese immigrants, as many of them do not consume enough health information on the internet. More than three quarters (76%) of participants (25 people) reported they consumed eHealth information fewer than 10 times in the past six months with 16 of those viewing health information less than 5 times.

In addition, the frequency of eHealth consumption seems to have an impact on the computer skills level of participants. The results of the computer literacy test show that frequency of consumption and computer literacy are correlated. Participants who have higher computer literacy consume eHealth content more frequently than those who do not. This may be because these individuals are more comfortable with browsing the web and are able to find more of their information online. Therefore, it is possible that those who have higher

computer skills are more likely to read health information on the internet which consequentially is more likely to lead to a higher eHealth literacy rate. This correlation indicates individuals who have a high eHealth literacy rate also read a lot of health information online.

Consequently, computer skills have a direct effect on eHealth literacy. This conclusion is supported by our research, as there is a strong positive correlation between the level of computer skills and eHealth literacy of participants. Individuals who have a greater ability to use their electronic devices have higher eHealth literacy rates. In the survey population, all except one participant reported they had their own cell phone illustrating that accessibility to technology is not an issue yet the skills regarding the use of devices are still lacking. The idea that computer skills play some role in eHealth literacy is shown in Cameron Norman’s research where he found that the six core skills to eHealth literacy are traditional literacy, health literacy, information literacy, scientific literacy, media literacy, and computer literacy (3).

It’s also important to note that a large majority of the health information that participants do consume is in Mandarin Chinese because of the target demographic. However, this doesn’t seem to make a large difference in our results when compared to other researchers’ results. This may be because of the availability of translation tools on the internet and automatic translation features which translates online content into the user’s prechosen language without user input.

There are a few limitations to this research. A correlational study can negatively affect the results and conclusions of the study because there could be extraneous factors or unknown variables that are causing both variables to change together. Correlation does not equal causation; therefore, we are unable to determine which of our variables cause the other. The small sample size is also a limitation as this research may not be able to be applied to a broader range of people. The participants of our study were all Chinese senior

citizens living around the Fairlawn area in New Jersey. Future research should work to encompass a larger group of more diverse participants.

To return to our original research question, our results support our prediction that there is a positive correlation between frequency of health information consumption and eHealth literacy in elderly Chinese Immigrants. Our research illustrates that individuals who consume more health information on the internet will exhibit higher electronic health literacy rates. Not only that, it goes beyond my original prediction and finds relationships between eHealth literacy and computer literacy as well. Computer literacy can be an important indicator of health literacy in elderly participants.

MATERIALS AND METHODS

Data Collection

An eHealth survey and relevant computer skills survey were given to 34 elderly Chinese immigrants who had been living in the United States for at least 5 years. All participants were members of the Broadway Adult Daycare LLC and were contacted in person over the course of several visits to the Daycare. All information and surveys distributed to participants were written in English then translated to Mandarin using human and machine translation. The survey that we used is a modified version of the eHEALS tool designed by Malcom Koo (16). There are several eHealth literacy surveys available on the internet, but we chose to use a modified version of the eHEALS survey because of its accuracy and consistency. Numerous studies have found that the eHEALS was the most reliable tool when measuring eHealth literacy. Dr. Norman found that eHEALS reliably and consistently captures eHealth literacy concept and shows promise as a tool for assessing familiarity and skill in using technology for health purposes (3). Our survey included a health literacy survey, a question asking how many times participants have seen or heard about health information in any form within the last 6 months, and a computer literacy survey. Participants responded to statements such as “I know what health resources are available on the internet” using a 5-point Likert scale to report their feelings towards the statement.

Data Analysis

Spearman correlation and regression lines were conducted for sets of data that included categorical data (frequency of consumption), which was done using Google Sheets formulas. Pearson correlation and the regression line was conducted on quantitative data (eHealth literacy score and computer literacy score) using Google Sheets formulas. Data was graphed and regression lines were added using Google Sheets. The data gathered from my survey implicates a positive correlation between the frequency of eHealth information consumption and eHealth literacy rates. The results of this study should encourage individuals to consume more health information on the internet in lieu of the relationship highlighted by my survey. By consuming more information there is the possibility of their computer skills and eHealth literacy skills increasing as well based on my survey results. Electronic health literacy is paramount in the 21st century as information technology grows rapidly and the use of electronic resources in health is increasing. Easy access, low cost, and fast searching have made the Internet a preferable choice in searching for health information (17).

Elderly Chinese immigrants should also work to use their electronic devices more to become more comfortable on digital platforms. The strong positive correlation between computer literacy and computer skills and eHealth literacy should not be ignored as it represents a key indicator of health literacy among Chinese elderly immigrants. Low eHealth literacy has effects on the prevalence of healthy behaviors such as healthy eating and physical activity which was referenced in the introduction. Important future research regarding the correlation between eHealth literacy and direct health aspects such as lifespan or disease infection rate should be conducted to better understand the implications for eHealth literacy rates in the elderly and their impacts on health and longevity.

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