

The Elderly's Preference towards Online Health Information Adoption during Covid-19 Outbreak

Abstract. Previous studies showed that the elderly often have difficulty accessing online health information, mainly due to their lower health literacy and elaborate information presentation. The study aims to explore the elderly's preferences and acceptance of online health information by integrating the Information Adoption Model (IAM) and health literacy self-rating scale into one research protocol. The face-to-face survey was administered to acquire data from 24 participants to help the elderly fill the questionnaires with better quality and validity. Results showed that during Covid-19, the elderly prefer titles with lower emotional concentration and an immense amount of information, articles with larger font size and more straightforward structure. Moreover, articles with visual content are also preferred by the elderly. Educational background, monthly income, and occupation significantly impact the elderly's preference for information and health literacy. This survey tries to provide primitive suggestions for the organization and disseminate health information for the elderly in a public health emergency, such as Covid-19, which is conducive to improving health knowledge popularization in government agencies or the public health system.

Keywords: public health emergency, the elderly, online health information, health literacy, Covid-19, information adoption.

1 Introduction

The outbreak of COVID-19 has brought severe challenges to the healthcare systems and the public's health information cognition capabilities worldwide. As of May 6, 2020, more than 3.74 million confirmed cases worldwide [1]. Government, health systems, and related enterprises need to establish information management systems to deal with public health emergencies. The epidemic information online will directly affect the scope and effectiveness of the spread of prevention and control information. Therefore, to improve the public's ability to understand epidemic knowledge, recognize rumors and implement prevention suggestions, it is necessary to clarify the target audience of health information and standardize its presentation modes. Especially the elderly who belongs to a vulnerable group of information acquisition and cognition. Due to factors such as cognitive ability, knowledge background, and information skill, the elderly face many technical difficulties in seeking, acquiring and understanding online health information.

China is facing the great challenge of the rapid aging of the population. It is predicted that from 2020 to 2050, China's population older than 60 will rise from 263 million to

522 million [2]. The shortage of public medical and health resources will further increase the pressure on the public. However, the aging population's recent increase is mainly due to many middle-aged people turning into older adults. Therefore, it could be a window of opportunity to improve the elderly's health status [3]. The prevalence of chronic diseases among the elderly is high, which results in the enormous requirement of medical resources and heavy family financial burden. Therefore, the application of online health information, such as telemedicine services and online health counseling, is becoming increasingly important. The rapid development of the internet will inevitably change the cognition of health, consumption and pensions of the elderly. As their information awareness increasing, they rely more on searching for health information through the internet, improving the health condition through personal attention to medical information and nutritious diet [4]. However, the influencing factors of the dissemination of online health information are still at the stage of exploration. Furthermore, there is a lack of research on improving the elderly's adoption of online health information during health crises, i.e., Covid-19, which brings information epidemic pressure for the elderly and worsens their situation. This article investigates the effects of characteristics of online health information on the elderly's intention and preferences to adopt health information. Also, we integrate health literacy into the research and explore the mediating or regulating role of health literacy in the elderly's adoption of health information. Thus, our research tries to investigate the elderly's preference for online health information adoption in the following perspectives:

- 1) What preferences do the elderly have for the adoption of COVID-19 related information?
- 2) What factors influence the elderly's preferences?
- 3) How does the elderly's health literacy affect the relationship between the influencing factors and the elderly's preferences for information adoption?

2 Related work

2.1 Information adoption model and the elderly's health information behavior

Information Adoption (IA) is derived from the theory of technology adoption, which refers to the subject's decision-making process. It is a process basing on self-cognition and self-needs, using the analysis and evaluation of the validity and usefulness of the information, to develop the willingness to identify and accept information [5]. Based on the Technology Acceptance Model (TAM), the Information Adoption Model (IAM) was proposed to define the impact of source credibility and information quality on perceived credibility and has gradually been widely used in the research of various online information adoption issues [6].

Existing literature on the health information behavior of the elderly indicates that more and older people are searching for health information online [7], and information factors, personal attitude and ability, social factors, and individual implementation cost

affect the searching and browsing behavior of the elderly [8][9][10]. Among them, information factors, including information characteristics, information benefits and information service activities, affect the efficiency of the elderly's health information search procedure, resulting in information overload, inappropriate expression, and the inability to judge the quality of arguments, therefore hinder the elderly's use of online health information. Besides, personal psychological factors, including self-perceived health needs and information credibility evaluation, are direct influencing factors of information adoption [10]. Plenty of empirical tests have verified that users' trust in health information positively affects their willingness to adopt health information. Moreover, trust mainly comes from information support, which depends on the information quality and source credibility of health information. Meanwhile, health literacy can mediate and regulate the relationship between information support and trust [11].

2.2 Impact of the elderly's health literacy on preference to health information adoption

Health literacy (HL) was first used to formulate health education standards in American schools. It was proposed by Simonds (1974) and has been continuously enriched and refined all along with its development. Individuals with HL are required to have calculation, and decision-making abilities related to health information, promote and maintain good health through cognitive and social skills [12]. For measurements of health literacy, the widely used assessment tools are the Rapid Estimate of Adult Literacy in Medicine (REALM) [13] and the Test of Functional Health Literacy in Adults (TOFHLA) [14]. A commonly used Chinese assessment tool of health information literacy is the Residents' Health Literacy Questionnaire [15].

The health literacy of the elderly is affected by factors such as gender, age, educational background, and self-efficacy [16]. Compared to the rest of the population, the elderly generally have a lower level of health literacy, thus have a weaker ability to search, understand and use health information, which contradicts the higher health information needs of the elderly [17] [18]. Chin, Moeller, and Johnson [19] pointed out that low health literacy hinders the elderly from understanding information. Furthermore, when the online health information is poorly organized, the time cost and task burden of self-care for the elderly increase. Zhu and Deng [10] believe that personal psychological factors, personal implementation costs, information factors, and social factors are the main obstacles to the elderly's online health information query behavior.

2.3 The elderly's preference for online health information adoption

Characteristics of information refer to the salient features of a specific type of information in the content and form. Nelson, Todd and Wixon [31] used characteristics of information to assess the extent to which the system organizes information in an easy-to-understand method. Other scholars have proved that visualization [20], article structure [21] and the quality of arguments [22] can also affect information receivers' preference.

Health information mainly refers to all kinds of information closely related to people's daily life, healthy behaviors and aim to improve personal health [23]. Lederman, Fan and Smith [24] figured out that the characteristics of information organization in online health communities, including the quality of argumentation, the publisher's authority, the credibility of reference, and the masses' consensus directly affect users' degree of trust. Koo, Lim and Park [25] verified that the quality of information directly affects the behavioral intention of using healthy websites. Sun and Wang [5] selected seven characteristics of information as predictive indicators, divided into content and form to predict Weibo health information's adoption level. As a particular group, the elderly emphasize the readability and credibility of information such as theme, language, organization, format and emotion. Studies have shown that adding paragraph delimiters, headings, item sequence numbers to improve the text structure, using more specific word and sentence structures, providing a conceptual outline, can effectively improve the elderly's understanding memory of the health information [19].

In this study, characteristics of information are divided into two types: form and content, which includes six indexes: title characteristics, generality, visualization, fonts and length, subject of articles and source of arguments.

This study draws on the measurement variables and their relationships with IAM. Basing on the current research results of health information adoption, health literacy and characteristics of information were selected as independent variables to explore the influence of the elderly's Covid-19 related health information adoption behavior.

In order to explore the characteristics of the health information needs of the elderly and to improve their understanding of health information, this research comprehensively considers the effects and principles of the elderly's health literacy and characteristics of health information, hoping to provide useful suggestions for the information system to reduce the cognitive difficulty of the elderly by improving the presentation of health information.

3 Methods

3.1 Participants recruitment

The participants were 24 older adults, including 13 males and 11 females, aged between 60 and 90 ($M=20.11$, $SD=0.99$). The participants were distributed in Hengshui City, Hebei Province, and Jieyang City, Guangdong Province. The survey subjects had specific regional differences, and the data collection reflects individual diversity. Each participant was paid 30 yuan after completion of the survey. The participants had normal vision (or corrected vision) and average essential cognitive ability. To ensure the survey's quality, researchers took the form of face-to-face interviews to help the elderly read the questions, ensuring that the elderly understand the meaning of the questions and make corresponding answers. Therefore, the time for each participant to fill in the questionnaire took up more than 40 minutes. Due to the stay at home order during Covid-19, restricted qualified subjects were recruited.

3.2 Measurements construct

The measurements include three dimensions: demographic information, health literacy and characteristics of information. The demographic information mainly combined gender, age, educational background, occupation, monthly income and health status. The part of health literacy refers to the self-rating scale of health literacy. The participants' general knowledge, information processing ability, and health knowledge were evaluated by measuring their attitude literacy, knowledge literacy, behavioral literacy, skill literacy, and Covid-19 related knowledge. Characteristics of information are divided into form and content, including six indexes: title characteristics, generality, visualization, fonts and length, subject of articles and source of arguments. There are 3-6 characteristic attributes under each index. Basing on these indexes, which can measure three dimensions accurately and comprehensively [11], the questionnaire designed questions about Covid-19 related information. Detailed indexes are drawn in Fig. 1.

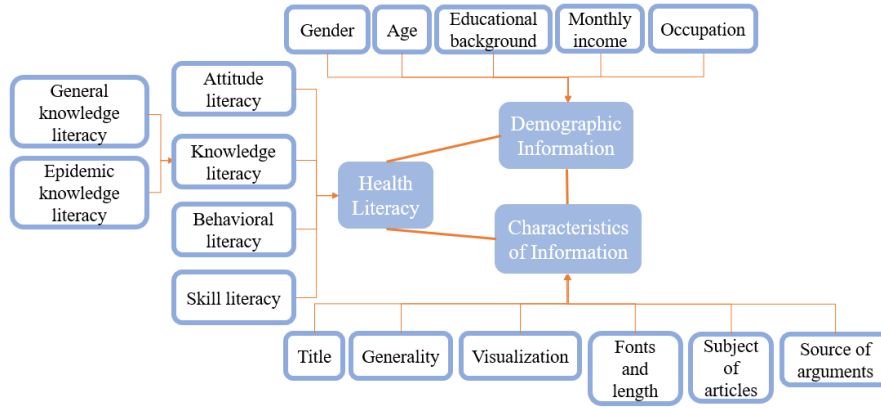


Fig. 1. The indexes involved in the questionnaire.

According to the participants' preference for different epidemic information examples or their understanding of the information, we can determine the user's preference for different epidemic information adoption. The specific questionnaire design is shown in Table 1.

Table 1. Attributes and reference of indexes

Indexes	Attributes	Reference
Attitude literacy	Understanding of health concepts, attitudes towards vaccination	[28] [15] [29]
Knowledge literacy	Health food and medicine, adult axillary body temperature, prevention of infectious diseases	

Behavioral literacy	Hand washing methods, sharing of personal belongings, handling sick and dead domestic birds, the wound treatment	
Skill literacy	The meaning of OTC	
Covid-19 related knowledge	Symptoms of infection, prevention of infection, use of masks, disinfection measures	
Characteristics of the title	Affective involvement, information quantity, click-bait	[23] [30]
Generality	Multiple levels of headings, summative statement	[30]
Visualization	Visual charts (tables, maps, line charts, etc.)	[20] [30]
Fonts and length	Font size and the length of articles	[30]
Subject of articles	Data, current affairs, policies concerning people's livelihood, science popularization, tackling scheme, refutation of rumor	[21] [23] [5] [30]
Source of arguments	Medical experts, authoritative institutions, journals and newspapers, statistical data	[22] [24]

3.3 The face-to-face data collection process

As the elderly have different information reading and understanding abilities, some may be weak, and this study adopted a face-to-face interview to fill in the questionnaire. The researchers helped to fully explain the questionnaire questions to the participants and filled in the questionnaire according to the answers of participants, making sure that the elderly understand the meaning of the questions and make corresponding answers.

4 Result

4.1 Demographic features of participants

Among the 24 participants, 13 were aged between 60 and 70, accounting for 52%. The age of 70-80 years old accounted for 36%, 80 years old and above accounted for 12%. As for the education background, undergraduate (or junior college) accounts for the largest proportion (60%), followed by junior high school, accounting for 20%. Furthermore, master or above accounts for 4%. In terms of monthly income, 4000-6000 yuan accounts for the largest proportion (35%), followed by 2000-4000 yuan, accounting for 27%, followed by more than 8000 yuan, 6000-8000 yuan and less than 2000 yuan. In

terms of occupation, senior executives and administrative personnel accounted for 24%, followed by professional and technical personnel, accounting for 20%, followed by farmworkers, service workers and salespeople. Detailed are drawn in Fig. 2.

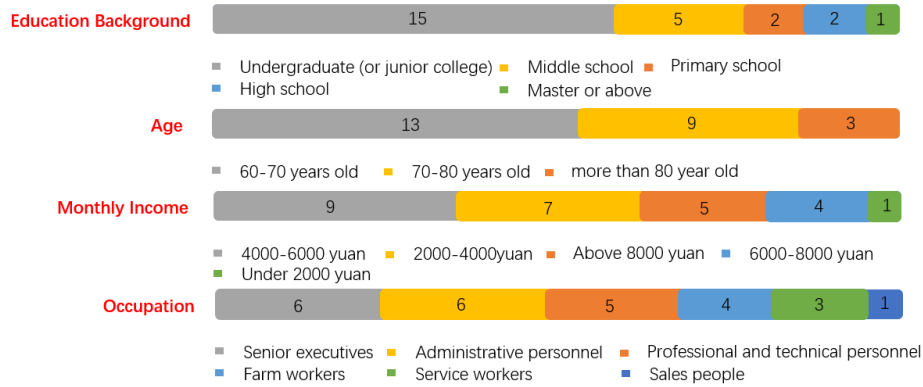


Fig. 2. Descriptive statistics of demographic information.

4.2 The preference of the elderly for online health information adoption

Mann-Whitney U test was used for analysis. The participants' scores in the title, font size, length, generality and visualization were compared with the median scores. The results showed that the participants significantly preferred titles with weak emotion and a large amount of information ($p < 0.001$), preferred large font size ($p < 0.001$), and articles with general sentences scored significantly higher than those without general statements ($p < 0.001$). The scores of data presented by visualization were significantly higher than those without visualization ($p < 0.001$). However, the elderly did not show a significant preference for articles' length ($p = 0.791$). Detailed are drawn in Table 2.

Table 2. The preference of the elderly for information

Statistical Method	Sig.	Title	Font	Length	Gener- ality	Visualization
Mann-Whitney U Test	<i>p</i>	0.000	0.000	0.791	0.000	0.000

Descriptive statistics and repeated measurement ANOVA were used to analyze the participants' preferences for the subject of articles and source of arguments. The descriptive statistics analysis results show that the top three popular subjects of Covid-19 related articles are: policies concerning people's livelihood, data and current affairs, with scores of 114, 112 and 100, respectively (See Fig. 3). The results of repeated measures ANOVA showed that the participants had a significant preference for the subject of the article, $F(5, 20)=6.285$, $p=0.001$, $\eta^2 = 0.611$. From the post-test results, articles on data subject were more attractive to participants than those on the refutation of rumor.

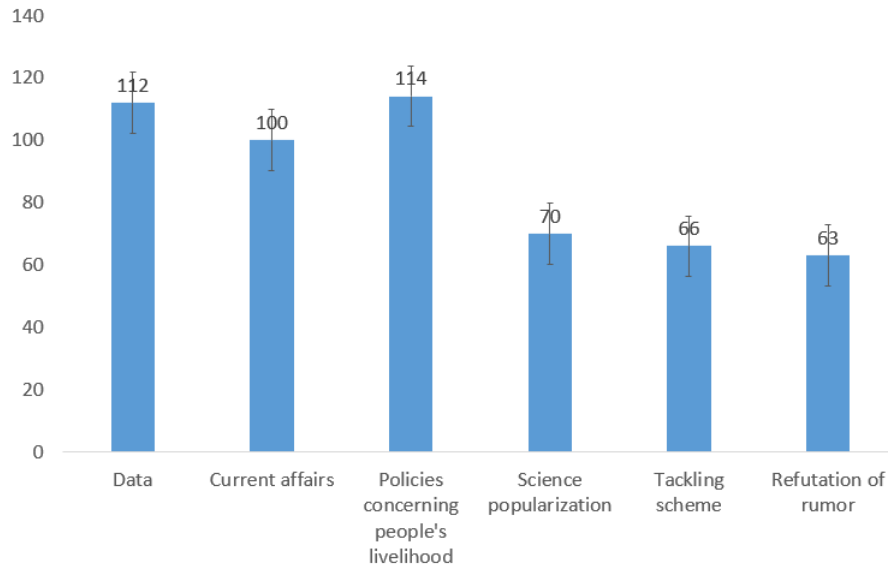


Fig. 3. Preference of subject of articles.

The results of descriptive statistical analysis on the sources of arguments showed that medical experts were the most trustworthy sources of information for participants, with 102, followed by journals and newspapers, authoritative institutions and statistical data, with scores of 76, 74 and 71. However, participants were least trusting of arguments from which there was no apparent source (See Fig. 4). The repeated measurement ANOVA results showed that the elderly had a significant preference for the source of arguments, $F(4, 16)=4.827$, $p=0.01$. Post-test showed that the elderly preferred medical experts to authoritative organizations ($MD=1.063$, $p=0.034$) and those without clear source arguments ($MD=1.778$, $p=0.005$).

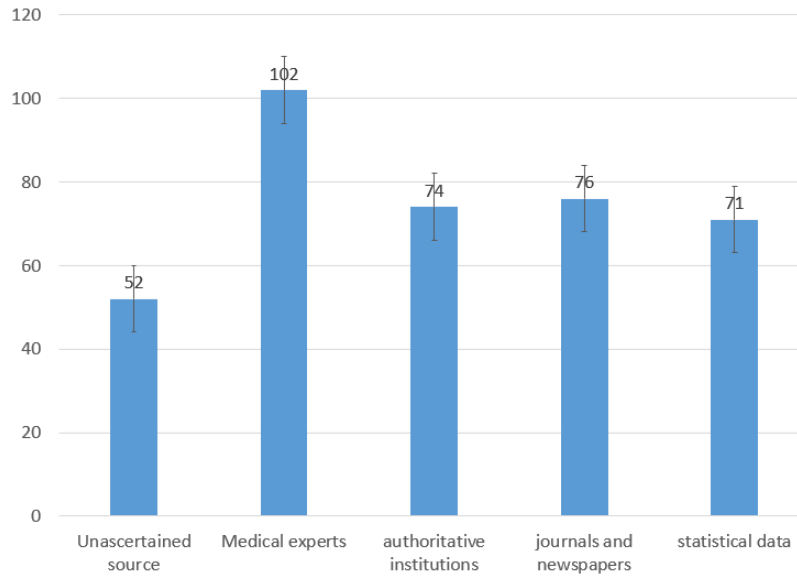


Fig. 4. Preference of sources of arguments.

4.3 The influence of demographic information on the elderly' preference for online health information adoption

Mann-Whitney U test was used to test whether there were differences in the preference of title, font size, length, generality and visualization among participants of different genders. The results showed that there were no significant differences in the participants' preferences of title ($p = 0.849$), font size ($p = 0.497$), length ($p = 0.264$), article structure ($p = 0.394$) and visualization ($p = 0.461$). Repeated measurement ANOVA was used to test whether there were significant differences in the preferences of different genders for the subject of articles and source of arguments. The results showed that the interaction between subject of articles and gender was not significant, $F(5, 115) = 0.303$, $p = 0.91$, and the interaction between argument type and gender was the same, $F(4, 92) = 0.264$, $p = 0.901$.

Pearson correlation was used to explore the correlation between participants' age and their preference for informational characteristics. The results showed that the Pearson correlation coefficients of age and the scores of title, font size, length, generality, visualization, subject of articles and source of arguments were -0.167 , -0.122 , -0.381 , 0.127 , -0.26 , 0.134 , 0.23 , respectively ($p = 0.425$, $p = 0.562$, $p = 0.061$, $p = 0.544$, $p = 0.209$, $p = 0.524$, $p = 0.27$). There was no significant correlation between them.

Jonckheere Terpstra test was used to test the scores of titles, font size, length, generality, visualization, subject of articles and source of arguments of participants with different education backgrounds, monthly income and occupations. The results of education background showed that the elderly with different education levels had significantly different preferences on title ($p = 0.012$), font size ($p = 0.02$) and length ($p =$

0.001). There were no significant differences in generality ($p = 0.481$), visualization ($p = 0.436$), subject of articles ($p = 0.432$) and source of arguments ($p = 0.907$). The post-test results showed that the scores of participants with undergraduate or junior college education background were significantly higher than those with junior middle school education background ($p = 0.04$). The scores of participants with senior high school, undergraduate, or junior college education background were significantly higher than those with junior high education background ($p = 0.047$ and $p = 0.007$, respectively). The participants' scores with undergraduate or junior college education background were significantly higher than those with junior high school and senior high school education background ($p = 0.04$ and $p = 0.031$, respectively).

The results of monthly income showed that the elderly with different monthly income levels had significantly different preferences for titles ($p = 0.003$). There was no significant difference in the preferences of font size ($p = 0.524$), length ($p = 0.653$), generality ($p = 0.349$), visualization ($p = 0.990$), subject of articles ($p = 0.184$) and source of arguments ($p = 0.404$). The post-test results showed that the scores of title of participants with monthly income of 6000-8000 yuan and above 8000 yuan significantly higher than those with a monthly income of 2000-4000 yuan ($p = 0.04$ and $P = 0.013$, respectively).

The results of occupations showed that participants with different occupations had significantly different preferences on titles ($p = 0.001$). There was no significant difference in font size ($p = 0.096$), length ($p = 0.147$), generality ($p = 0.395$), visualization ($p = 0.84$), subject of articles ($p = 0.833$) and source of arguments ($p = 0.882$). The post-test results showed that the scores of farmworkers on titles were significantly lower than those of professional and technical personnel and Senior executives ($p = 0.006$ and $p = 0.032$, respectively). The administrative personnel was significantly lower than the professional and technical personnel ($p = 0.035$). Furthermore, the service workers were significantly lower than the salespeople ($p = 0.011$). Detailed are drawn in Table 3.

Table 3. The influence of demographic information on the elderly' preference for information

Demographic Information	Sig.	Title	Font	Length	Genera-lity	Visuali-zation	Subject of arti-cles	Source of arguments
Gender	p	0.849	0.497	0.264	0.394	0.461	0.19	0.901
Age	p	0.425	0.562	0.061	0.544	0.209	0.524	0.27
Education background	p	0.012	0.020	0.001	0.481	0.436	0.432	0.907
Monthly income	p	0.003	0.524	0.653	0.349	0.990	0.184	0.404
Occupation	p	0.001	0.096	0.147	0.395	0.840	0.833	0.882

4.4 The impact of health literacy on the elderly' preference for online health information adoption

Pearson correlation was used to explore the correlation between participants' health literacy and the preference for informational characteristics. The results showed that the Pearson correlation coefficients between the health literacy of participants and their scores in age and the scores of titles, font size, length, generality, visualization, subject of articles and source of arguments were 0.266, 0.155, 0.514, 0.198, 0.009, 0.167, 0.032, respectively ($p = 0.199$, $p = 0.458$, $p = 0.009$, $p = 0.344$, $p = 0.967$, $p = 0.424$, $p = 0.881$). Detailed are drawn in Table 4. There is no significant correlation between informational characteristics preference and health literacy except for the length.

Table 4. The influence of health literacy on the elderly' preference for information

Result	Title	Font	Length	Generality	Visualization	Subject of articles	Source of arguments
Correlation coefficients	0.266	0.155	0.514	0.198	0.009	0.167	0.032
Sig. (p)	0.199	0.458	0.009	0.344	0.967	0.424	0.881

4.5 The influence of demographic information on the elderly's health literacy

The most extreme reaction test was used to explore the effect of gender on participants' health literacy. The results showed that there was no significant difference in health literacy between different genders.

Pearson correlation was used to explore the correlation between age and health literacy. The Pearson correlation coefficient was -0.231 ($p = 0.268$), which showed no correlation between age and health literacy.

Jonckheere Terpstra test was used to explore the effects of health literacy on education background and monthly income. The education background results showed significant differences in health literacy among participants with different educational backgrounds ($p = 0.008$). The post-test found that the health literacy of participants with primary school education background was significantly lower than that of participants with junior high school, undergraduate (or junior college) education background ($p = 0.022$, $p = 0.014$). Participants' health literacy with junior middle school education background was significantly lower than that of participants with undergraduate (or junior college) education background ($p = 0.039$).

The results of monthly income showed that the health literacy of participants with different monthly income was significantly different ($p < 0.001$). The results showed that the health literacy of participants with a monthly income of 2000-4000 yuan was significantly lower than that of participants with a monthly income of 4000-6000 yuan, 6000-8000 yuan and 8000 yuan ($p = 0.05$, $p = 0.009$, $p = 0.003$). Participants' health literacy with a monthly income of 4000-6000 yuan was significantly lower than that of

participants with a monthly wage of 6000-8000 yuan and 8000 yuan ($p=0.019$, $p=0.005$).

Kruskal Wallis test was used to test the relationship between occupation and health literacy of participants. The results showed that participants' health literacy with different occupations significantly differed ($p = 0.024$). The post-test found that the health literacy of participants working as farmworkers before retirement was significantly lower than that of participants working as professional and technical personnel and senior executives before retirement ($p = 0.013$, $p = 0.002$). The health literacy of participants working as administrative personnel before retirement was significantly lower than that of participants working as senior executives before retirement ($p = 0.034$). Detailed are drawn in Table 5.

Table 5. The influence of demographic information on the elderly's health literacy

	Result	Gender	Age	Educational background	Monthly income	occupation
Health literacy	p	0.450	0.268	0.008	0.000	0.024

4.6 The impact of health literacy on the relationship between demographic features and preference of the elderly for online health information adoption

Firstly, a regression equation was used to test whether health literacy was a moderator. The results showed that the significance of F variation was 0.793. Moreover, the significant interaction coefficient of gender, age, education background, monthly income and occupation and health literacy was $p = 0.595$, $p = 0.448$, $p = 0.654$, $p = 0.555$, $p = 0.744$, which were all greater than 0.05, indicating that health literacy was not a moderating variable for different the elderly' preference for titles. The same method was used to test whether there is a moderating effect of health literacy on the relationship between demographic characteristics of the elderly and their preference for font size, length, generality, visualization, subject of articles and source of arguments. The results show that health literacy is not a moderating variable for different the elderly's preference for font size, length, generality, visualization, subject of articles and source of arguments.

Secondly, a regression equation was used to test whether the mediating effect of health literacy exists. The results show that the regression coefficients of gender, age and information characteristics preference of the elderly are not significant, so the mediating effect does not exist.

The regression coefficient between the educational background and the elderly's preference for the title is significant, and the coefficient is $c=1.719$, $SE=0.717$, $t=2.399$, $p=0.025$. Then the regression equation between education background and health literacy is tested. The coefficient is $a=1.851$, $SE=0.597$, $t=3.1$, $p=0.005$. Because the regression coefficient is significant, the regression equation between education background, health literacy and the elderly's preference for titles is tested, and the

coefficient of health literacy is $b=0.037$, $SE=0.256$, $t=0.144$, $p=0.887$. Since the regression coefficient was not significant, the Sobel test was carried out. The results showed that $p = 0.885$, indicating no mediating effect of health literacy on Title preference. According to the same method, health literacy's mediating effect on other demographic factors on information characteristics preference is tested. The results show that the mediating effect of health literacy does not exist.

5 Conclusion

The questionnaire data's quantitative analysis found that the elderly have an apparent preference for Covid-19 related information characteristics. The elderly prefer titles with lower emotional concentration and a more considerable amount of information for title characteristics. Moreover, articles with clickbait are not significantly attractive to the elderly. Also, the elderly have a clear preference for articles with large font sizes. Articles with the summary sentence (generality) and visualization are also preferred. However, the elderly do not show an apparent preference for the length of articles. The conclusions above are consistent with the accessibility index of information [26], the "live effect" theory [20] and the "framework effect" theory [21].

These results indicate that larger font size, summary sentences, and visualization will reduce the reading difficulty and raise the possibility of adopting. Also, these expand the research scope of information content characteristics, including the title and font size. For the subject of articles, the elderly pay more attention to policies concerning people's livelihood, data and current affairs. For the source of arguments, the elderly trust medical experts most, followed by journals and newspapers, authoritative institutions and statistical data. This conclusion is consistent with the proven indicators such as the author's ability, reference credibility and public awareness [24]. Due to professional literacy, the right social image and the ability to speak on behalf of the public consciousness, medical experts have become the most trusted group during the epidemic.

Through the research on the influence of demographic factors on the preference for information, it can be seen that gender and age have no significant influence on the preference of the elderly. However, from the perspective of education background, the elderly with higher education background has a significant preference for the title with lower emotional concentration and a more considerable amount of information, articles with a smaller font and longer length. The elderly with higher monthly income (6000-8000 yuan and above) prefer titles with low emotional concentration and a large amount of information than those with lower monthly income (2000-4000 yuan). Similarly, from occupation, professional and technical personnel, senior executives prefer titles with low emotional concentration and a large amount of information more than farm-workers and service workers.

It is found that there is a significant positive correlation between the elderly's preference for the length of articles and their health literacy. That is, the elderly with higher health literacy prefer long articles. However, there is no significant correlation between their preference for other information characteristics and their health literacy.

Some demographic factors have a significant impact on the health literacy of the elderly, especially the education background, monthly income and occupation. The health literacy of the elderly with undergraduate (or junior college) education background is significantly higher than that of the elderly with primary and junior high education background. The health literacy of the elderly with junior high school education background is also significantly higher than that of the elderly with a primary education background. It can be seen that there is a positive correlation between education background and health literacy. By monitoring the health literacy of urban and rural residents in the east and west, some scholars also pointed out that the higher the level of education, the higher the level of health literacy [27].

Similarly, the health literacy of the elderly with higher monthly income will be significantly higher than that of the elderly with lower monthly income. Besides, the health literacy of the elderly professional and technical personnel and senior executives before retirement is significantly higher than those of administrative personnel and farmworkers before retirement. The reason for the analysis is that education affects the nature of the elderly's work before retirement. Furthermore, the job is related to social status and the possession of health information resources. Besides, people with a lower education level have less ability to read and understand, and less awareness and ability to use the internet. Therefore, education has become the most important demographic factor affecting health literacy.

The results show no moderating effect or mediating effect on the relationship between demographic factors and information characteristics preference of the elderly. This study is different from previous conclusions based on health information adoption models. For example, some scholars verified that health literacy could mediate the relationship between source credibility and information support and the relationship between the quality of arguments and information support [11].

6 Discussion and limitations

Basing on the outbreak of the epidemic and the background of vulnerable groups of the elderly, considering the information transmission mode of public health emergencies and the health information needs of the elderly, the IAM model and health literacy measurement tools were used to explore the elderly's information adoption behavior in this study. It is found that demographic information of the elderly directly affects their health literacy and preference for information. Furthermore, the elderly's health literacy also has an impact on their preference for information. However, there is no mediating or moderating effect of health literacy on the relationship between demographic information and preference for information of the elderly. Therefore, it is necessary to pay attention to the elderly and other vulnerable groups' health information seeking and understanding ability in public health emergencies. Social media or official institutions should improve information quality and enrich their information presentation mode from three aspects:

- 1) Standardize the title form of essential documents or news, increase the amount of information, and reduce titles' emotional concentration.

2) In order to make the articles more concise and more comfortable to read, we should add appropriate short titles, summary sentences and adjust the line spacing for longer articles or articles for the elderly.

3) For more complex information such as numbers, geographical locations and trends, visual charts should be increased. However, we should be careful to use statistical charts that require higher learning costs.

Meanwhile, there are some limitations to this study. The first is the sample size. Due to the two reasons explained above, this study's small sample size harms the experimental results' general applicability. Second, the study did not consider the skill level of the elderly in accessing online health information, so the follow-up studies can be based on this to subdivide the elderly for further exploration.

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