Health Information Literacy of the Older Adults and Their Intention to Share Health Rumors: An Analysis from the Perspective of Socioemotional Selectivity Theory

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Abstract. Health rumor promises to resolve uncertainty or provide new insight into important health-related phenomena. Older adults who are more concerned about health issues are plagued by the health rumors more seriously. Why do older people prefer to share health rumors and how to protect the elderly from online health rumors are becoming a new public health concern. This study attempts to understand the health information behavior of the elderly from the perspective of socioemotional selectivity theory (SST), and to find out the possible relationship between health information literacy and health rumor sharing intention of the older adults. The results showed that health information literacy and knowledge acquisition goal were negatively related to the intention to share health rumors while emotion regulation goal had a positive influence on it. Interaction effects were also significant between the independent variables and the dependent variable. In the process of aging, the competition between knowledge acquisition goal and emotion regulation goal will play an important role in the information behaviors of individuals. Health information literacy not only helps the older adults to identify health rumors to avoid spreading them but also guides the elderly to avoid deception of false information and make incorrect health decisions.

Keywords: Health information literacy · Health rumor ·
Socioemotional selectivity theory (SST) · Older adult

1 Introduction

Advances in the online social network and mobile computing devices have revolutionized the way people access to and share information in daily life. People are also inclined to seek information and help from the Internet when facing health decision-making [22, 25, 34, 39]. Health rumors may be included in their search results that have a potential threat to the information seekers because they usually can't distinguish fake health information [24]. Health rumors are unverified information that lacks a secure standard of evidence. They widely spread among groups of people because this information promises to resolve uncertainty or provide new insight into important health-related phenomena [40]. Older adults who are more concerned about health

issues are plagued by the health rumors more seriously. Guess et al. [18] founded that people who were over 65 had the highest rate of fake news sharing than other age groups. Why do older people prefer to share health rumors and how to protect the elderly from online health rumors are becoming a new public health concern.

Lack of competencies related to seeking, understanding and evaluating health information may impair the ability to make correct health-related decisions. Therefore, health information literacy has become a focus for understanding and exploring health behaviors. Previous research assessed people's health information literacy about perceived ability to identify a health information need, confidence in being able to find and use health information, preferences for health information sources, and determining information quality [16, 17, 28]. Individuals' ability to evaluate the quality of health information and identify health rumors is closely related to their health information literacy. It is reasonable to analyze why older adults share health rumors from the perspective of health information literacy.

In addition, the psychological factors of the elderly, which are different from those of other age groups, have to be taken into account. Socioemotional selectivity theory (SST) tells us individuals at different ages have different perceptions of future time. These differences will make people make different goal choices [7]. Generally speaking, young people perceive that the future time is relatively abundant, and they prefer to acquire knowledge as their goals, whereas older people prefer to choose emotional regulation as their goals, which is particularly evident in the process of aging [10]. This theory gives us a different perspective to explore the health information behavior of the elderly. Therefore, this study attempts to understand the health information behavior of the elderly from the perspective of SST, and to find out the possible relationship between health information literacy and health rumor sharing intention of the older adults.

2   Theory and Hypotheses

2.1   Health Rumor

Rumors are a particular form of misinformation – an acceptance of information that is factually unsubstantiated – characterized by two features. Firstly, rumors are statements that lack specific standards of evidence [3]. Secondly, rumors are more than fringe beliefs. They acquire their power through widespread social transmission [6]. Sunstein [37] defined the term to be the 'claims of fact – about people, groups, events and institutions – that have not been shown to be true, but that move from one person to another and hence have credibility not because direct evidence is known to support them, but because other people seem to believe them'. With the advent of the Internet age, the cost of information creating and dissemination has dropped sharply, and the number of rumors has also risen sharply. When health-related rumors are spread, they not only create confusion but also stir up unnecessary anxiety [11]. Depending on their ability to create anxiety, rumors are commonly classified as either dread or wish [12]. The former type of rumors usually cause panic about health threats while the latter, however, leads to a belief in false health benefits.

Attention to health rumors has led scholars to conduct relevant research. Zhang et al. [40] explored the associations between the authenticity of health rumors and some indicators of the rumors themselves. Chua et al. [11] investigated how epistemic belief affected Internet users' decision to share online health rumors. They also examined the effects of characteristics of rumors on user's decision-making. Lee and Choi [27] discussed about false rumors related to the spread of MERS virus and its influence on people's accuracy-oriented information seeking. Faced with health rumors in social networks, Sicilia et al. [35] developed a novel health-related rumor detection system on Twitter to detect if a post was either a rumor or not. It can be seen that previous rumor studies can be mainly divided into two categories: spreading mechanism studies and motivation studies [41]. However, there is still a lack of research on health rumor sharing behavior among the elderly. In the current network environment, more often than not, the elderly are not sure whether the health information they are exposed to is a rumor or not. And elderly people share health rumors without malice, just to convey information to others to improve or maintain health level. This makes it more difficult to protect the elderly from health rumors.

2.2   Health Information Literacy

The concept of health information literacy brings together the concepts of health literacy and information literacy [20, 21, 38]. American Medical Association (AMA) has defined health literacy as 'the skill set including the ability of basic reading and of performing required digital tasks for functions within the scope of health services' [1]. WTO defined it as 'the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand, and use information in ways which promote and maintain good health' [30]. As can be seen from these definitions, health literacy focuses on the abilities to apply literacy skills to health related materials. Comparatively speaking, the concept of information literacy appeared earlier, that is "a set of abilities requiring individuals to recognize when information is needed and to have the ability to locate, evaluate, and use effectively the needed information" [2]. It emphasizes the ability to process and utilize information. Under the combination of the two, the concept of health information literacy focuses on the higher level cognitive and social skills needed to cope in the complex health information environment [21]. We believe that the concept of health information literacy is 'the set of abilities needed to recognize a health information need, identify likely information sources and use them to retrieve relevant information, assess the quality of the information and its applicability to a specific situation, and analyze, understand, and use the information to make good health decisions' [4].

Exploring health information behavior from the perspective of health information literacy has become the focus of many scholars' research. Suka et al. [36] examined the relationship between health literacy, health information access, health behavior, and health status in Japanese adults aged 20–64 years. They founded that those with higher health literacy were significantly more likely to get sufficient health information from multiple sources. The study of Aydın et al. [5] proposed that the person who was health literate should have the knowledge and ability to adapt him/herself to health life style and to make healthy choices. Quinn et al. [31] pointed out that the ability to locate,

evaluate and use online health information may be influenced by an individual's level of health literacy and eHealth literacy. Hirvonen et al. [21] pointed out that health information literacy is positively associated with various health-promoting behaviors. It can be seen that scholars generally believe that health information literacy can make a positive impact on individuals' health information behavior.

In the age of information explosion, many times the information we come across is not credible enough. Especially for the elderly, health concerns make them more likely to be disturbed by uncertain health information. Rather than sharing health rumors, older people share unconfirmed health information without sufficient judgment. Health information literacy represents individuals' ability to identify health information sources and assess the quality of health information. Usually we think that people with lower health information literacy have lower ability to judge the quality of health information [14]. That is to say, higher health information literacy can help individuals to judge whether health information is true or false, thereby reducing the possibility of sharing health rumors. Therefore, we propose the following research hypothesis:

H1 Health information literacy has a negative association with the intention to share health rumors.

2.3   Socioemotional Selectivity Theory (SST)

Socioemotional selectivity theory maintains that time horizons influence goals [8]. When time is perceived as open-ended, goals are most likely to be preparatory, for example, gathering information, experiencing novelty and expanding breadth of knowledge. When constraints on time are perceived, goals focus more on objectives that can be realized in their very pursuit. Under these conditions, goals emphasize feeling states, particularly regulating emotional states to optimize well-being [29]. According to this theory, there are two kinds of social goals that affect an individual's behavior. The first is acquisition of knowledge which is future-oriented, and the second is regulation of emotions which is present-oriented [9, 10]. Motivation to acquire knowledge and regulate emotions constitutes a dynamic system to stimulate social behavioral goals in the course of life. In specific situations, knowledge-related goals and emotional regulation goals compete with each other. Individuals can make choices only after weighing the importance of the two kinds of goals, and then produce corresponding behavioral responses. So we infer that knowledge-related goals will promote individuals' rational evaluation of information quality from a cognitive perspective while emotional regulation goals will pay more attention to the emotional perspective and neglect the evaluation of information quality. Thus we propose the following research hypothesis:

H2 Knowledge acquisition goal has a negative association with the intention to share health rumors.
H3 Emotion regulation goal has a positive association with the intention to share health rumors.

SST believes that older adults are more aware of the limitation of time; they tend to dissolve negative emotional experience in life, and pay more attention to the positive side, that is, to show "positive effect (the preference of the elderly for positive information)" in the process of aging [32]. It can be seen from the studies of Carstensen et al. that the main assertion of socioemotional selectivity theory is that when boundaries on time are perceived, present-oriented goals related to emotional meaning are prioritized over future-oriented goals aimed at acquiring information and expanding horizons [26]. While there are times when other goals are more highly prioritized such as when aged people reviewing decisions about health [15]. As mentioned above, health information literacy is an individual's ability to acquire information to maintain their own health. It has a negative association with individual's intention to share health rumors. Since individuals' behaviors are influenced by goals, we have reason to believe that social goals including knowledge acquisition and emotion regulation play a moderating role between health information literacy and health rumor sharing intention. Health rumor promises to resolve uncertainty or provide new insight into important health-related phenomena. This is undoubtedly a positive message for older people who are more concerned about their health. According to the SST, "positive effect" of the elderly leads to their preference for positive information and weakens their goals of information acquisition. Therefore, we hypothesize that when the goal of knowledge acquisition is high, the intention of elderly people to share health rumors will be weakened; on the contrary, when the goal of emotional regulation is higher, the elderly's intention to share health rumors will be enhanced. Thus we propose the following research hypothesis:

H4 Knowledge acquisition goal will enhance the association between health information literacy and intention to share health rumors.

H5 Emotion regulation goal will weaken the association between health information literacy and intention to share health rumors.

Figure 1 shows the theoretical framework of this study.
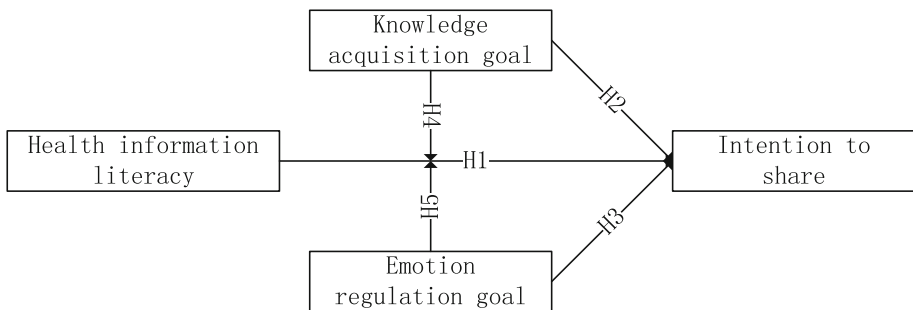
Fig. 1. Theoretical framework

3   Methods

3.1   Samples and Measures

We obtained empirical data through an online survey. Survey data were collected online through 'Tieba of the Aged' subordinate to Baidu Tieba, the largest Chinese online community. The eligible participants came from a nationwide sample of online community users who were over the age of fifty. The measures of the health information literacy construct were adopted from Jordan et al. [23] and Hirvonen et al. [21] to develop our questionnaire. Measures of the two social goals come from our self-built scale. Finally, 410 valid questionnaires were collected in this study. We investigated participants' gender and age. The demographic characteristics of the sample are shown in the Table 1.

Table 1. Demographic characteristics of the sample

Demographic characteristics		n	%
Gender	Male	201	49.0%
	Female	209	51.0%
Age	50–55	56	13.7%
	56–60	112	27.3%
	61–65	117	28.5%
	66–70	125	30.5%

Among the participants in this survey, 49.0% were men and 51.0% were women. People who are between 50 and 55 are the least and the distribution of people in other age groups was balanced, with the proportion ranging from 27.3% to 30.5%.

Table 2 shows the contents of the scale and we used a 5-point Likert scale, ranging from 'strongly disagree' (1) to 'strongly agree' (5).

Table 2. Survey scale

Construct	Item	Content
Health information literacy	HIL1	I need information about health issues
	HIL2	I know how to find the health information I need
	HIL3	It is easy to assess the reliability of health information on the Internet
	HIL4	I apply health related information to my own life and/or that of people close to me
Knowledge acquisition goal	KAG1	I like learning new knowledge
	KAG2	I have a goal of learning new knowledge
	KAG3	I am willing to constantly enrich my knowledge base

(continued)

Table 2. (*continued*)

Construct	Item	Content
Emotion regulation goal	ERG1	I think it's important to keep myself happy
	ERG2	I like to keep myself in a positive mood
	ERG3	I am more concerned about my current situation
Intention to share health rumors	INT1	I like to share health-related information, even though I don't know where it comes from
	INT2	As for health-related information, I think it's better to trust it than not
	INT3	Even if it's not clear whether health-related information is credible, I like to share it with people around me

3.2   Confirmatory Factor Analysis

We assessed the measurement model by examining the convergent validity and discriminant validity. In confirmatory factor analysis, convergent validity is measured by standardized regression weights, composite reliability (CR) and average variance extracted (AVE) [33]. As shown in the Table 3, all of the item loadings are above the recommended 0.7 and significant, and the composite reliability (CR) exceeds the recommended level of 0.7, and the average variance extracted (AVE) values are above the recommended level of 0.5 [19].

Table 3. Convergent validity of the constructs and items

Construct	Item	Loading	CR	AVE
Health information literacy	HIL1	0.723	0.895	0.681
	HIL2	0.793		
	HIL3	0.896		
	HIL4	0.878		
Knowledge acquisition goal	KAG1	0.765	0.868	0.689
	KAG2	0.933		
	KAG3	0.781		
Emotion regulation goal	ERG1	0.777	0.816	0.597
	ERG2	0.723		
	ERG3	0.815		
Intention	INT1	0.797	0.853	0.659
	INT2	0.856		
	INT3	0.780		

Then we compared the square roots of the AVEs with the latent variable correlations and the results show good discriminant validity [19] as shown in Table 4.

Table 4. Latent variable correlations & square roots of AVE

Constructs	Mean	SD	HIL	KAG	ERG	INT
HIL	2.184	0.784	**0.825**			
KAG	2.055	0.775	0.555	**0.830**		
ERG	3.532	0.802	−0.577	−0.568	**0.773**	
INT	4.038	0.781	−0.634	−0.528	0.607	**0.812**

3.3   Hypothesis Test

The results of the hierarchical multiple regression are presented in Table 5. Within the regression testing, latent variables were created as summated indexes. We standardized all variables to reduce the potential effects of multicollinearity and the values of variance inflation factor (VIF) were inspected to check for potential multicollinearity. In the process of regression, control variables entered as a block in step 1 (gender and age), followed by the main effects in step 2 (health information literacy, knowledge acquisition goal and emotion regulation goal), and the interactions were in step 3. The highest VIF value was 1.815, confirming that multicollinearity was not a problem.

Table 5. Results of the hierarchical multiple regression analyses

	Intention to share health rumors (β)		
	Model 1	Model 2	Model 3
Age	0.011	0.021	0.017
Gender	0.062	0.059	0.063
HIL		−0.368***	−0.330***
KAG		−0.166**	−0.200***
ERG		0.233***	0.211***
HIL×KAG			0.132**
HIL×ERG			0.172***
R^2	0.004	0.406	0.423
Adjusted R^2	−0.001	0.399	0.413
R^2 change	0.004	0.402	0.017

Note: HIL: Health information literacy, KAG: Knowledge acquisition goal, ERG: Emotion regulation goal, ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$.

4   Results

All statistical inferences were drawn based on Model 3. Table 5 shows that age ($\beta = 0.017$, $p > 0.05$) and gender ($\beta = 0.063$, $p > 0.05$) have no significant associations with the intention to share health rumors. It proved that age and gender did not affect the intention to share health rumors among the elderly.

All the hypotheses about the main effects are supported by the data analysis results. Health information literacy was negatively related to the intention to share health rumors ($\beta = -0.330$, $p < 0.001$) and H1 was supported. The greater the health information literacy of an older adult, the lower was the intention to share health rumors. Knowledge acquisition goal was negatively related to the intention to share health rumors ($\beta = -0.200$, $p < 0.001$) and H2 was supported. The greater the knowledge acquisition goal of an older adult, the lower was the intention to share health rumors. Emotion regulation goal was positively related to the intention to share health rumors ($\beta = 0.211$, $p < 0.001$) and H3 was supported. The greater the emotion regulation goal of an older adult, the higher was the intention to share health rumors.

In the analysis of interaction effects, knowledge acquisition goal moderated the association between health information literacy and the intention to share health rumors ($\beta = 0.132$, $p < 0.01$). Though the effect was significant, the result showed that knowledge acquisition goal could weaken the association between health information literacy and the sharing intention. This result was contrary to the hypothesis so H4 was not supported. Emotion regulation goal will weaken the association between health information literacy and intention to share health rumors ($\beta = 0.172$, $p < 0.001$). The effect was significant and H5 was supported.

5   Discussion

As can be seen from the data in Table 4, the older adults as the sample of this study had a low level of health information literacy and knowledge acquisition goal. This phenomenon not only reflects the low level of health information literacy of the elderly in China, but also confirms the view of SST that future-oriented goals are less important to the elderly. In this case, it's not hard to understand why the average of health rumors sharing intentions and emotional regulation goal is relatively higher.

Health information literacy has the highest negative effect on the intention to share health rumors ($\beta = -0.330$, $p < 0.001$) following by the knowledge acquisition goal ($\beta = -0.200$, $p < 0.001$). While emotion regulation goal has a positive effect on the intention to share health rumors ($\beta = 0.211$, $p < 0.001$). Comparing the absolute values of the regression coefficients of the two social goals, the effect of emotion regulation goal is greater than that of knowledge acquisition goal. It is inevitable that individual behavior is influenced by social goals. In the process of aging, the competition between knowledge acquisition goal and emotion regulation goal will play an important role in the information behaviors of individuals and this role is to some extent uncontrollable. Although efforts cannot be made to help the elderly identify health rumors from the perspective of social goals, it is feasible to improve the health information literacy of the elderly. Improving health information literacy means improving the ability of older people to identify health information needs, evaluate health information quality and use

health information to maintain their health. Health information literacy not only helps the older adults to identify health rumors to avoid spreading them but also guides the elderly to avoid deception of false information and make incorrect health decisions.

Emotion regulation goal moderated the association between health information literacy and the intention to share health rumors ($\beta = 0.172$, $p < 0.001$). According to Cohen et al. [13], if one predictor weakens the effect of the other predictor, the interactive effect is the buffering interaction. In this case, the coefficient of health information literacy on intention to share health rumors is -0.330 while the interaction of HIL×ERG is 0.172. It means the negative effect of health information literacy on the intention to share health rumors will gradually weaken as the emotion regulation goal increases. For the study of health information behavior of the elderly, we should not ignore the psychological factors that the elderly are different from the young. Under the positive effect, the health information literacy of the elderly will be weakened. And preferences that favor positive and ignore negative information are either because potential warning signs are ignored or because messages about too-good-to-be-true prospects are especially salient [32]. This suggests that we should be patient enough to face this problem. When the improvement of health information literacy of the elderly is disturbed by their own psychological factors, the external intervention mechanism should play a sufficient role in helping and guiding them.

In addition, one other interesting finding emerged. Though the moderating effect was significant, the result showed that knowledge acquisition goal could weaken the association between health information literacy and the sharing intention ($\beta = 0.132$, $p < 0.01$). Although the data analysis result is inconsistent with the research hypothesis, we still think that this result is meaningful. Cohen et al. [13] believed that there was another interaction pattern named interference or antagonistic interaction. It means both predictors work on the criterion in the same direction, and the interaction is of opposite sign. How to explain this result scientifically is still lack of further validation. However, we may assume that because the health information literacy and knowledge acquisition goals of the samples in this study are at a low level, the importance of exceptional ability may be lessened by exceptional motivation, and vice versa [13].

6   Conclusion

In conclusion, this paper has found that the health information literacy, knowledge acquisition goal and emotion regulation goal have significant association with the intention of the older adults to share health rumors. It also verifies the interaction effects of the two social goals on the association between health information literacy and health rumor sharing intention. In our research, socioemotional selectivity theory was introduced into the study of health information behavior that provides a new perspective for research in related fields. And we emphasize that the study of information behavior of the elderly should not ignore the unique psychological factors of the elderly. On the other hand, the findings of this study partly explain why older people are more likely to share health rumors. We also suggest that we should start with health information literacy to improve the ability of the elderly to identify health rumors and evaluate the quality of health information. Only in this way can the elderly be

fundamentally protected from health rumors. Since there is still an unsupported hypothesis in this study, future research can start with the goal of knowledge acquisition and explore its role in health information behavior of the elderly.

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