



The impact of information encountering on the health literacy of older adults in health science short videos

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DOI: <https://doi.org/10.47989/ir31ISIC65241>

Abstract

Introduction. This study investigates the role of information encountering through health science short videos in the development of health literacy among older adults. It aims to provide empirical evidence on whether and how passive information exposure influences older adults' health literacy.

Method. An offline survey was conducted in China, yielding 306 valid questionnaires. The analysis employed ordinary least squares regression combined with propensity score matching to identify the effect of information encountering on health literacy.

Analysis. Quantitative analysis of the survey data was performed, focusing on comparing health literacy outcomes between older adults who experienced information encountering and those who did not, while controlling for relevant demographic and behavioural variables.

Results. The results show that 71.24% of respondents have experienced information encountering in health science short videos. These individuals demonstrated a higher level of health literacy than those who did not. Furthermore, gender, higher education, social media use, and active health information seeking were associated with higher health literacy, while these same factors, along with residing in rural areas, retirement, chronic diseases, and poorer health status, predicted a higher likelihood of information encountering.

Conclusion. Information encountering represents a significant mechanism for improving health literacy among older adults. These findings emphasise the importance of passive information channels in health promotion and offer both theoretical insights and practical implications for enhancing health literacy in aging populations.

Introduction

Health literacy is very important for individuals to access health information and manage their health status. However, older adults aged 60 years and above usually have limited health literacy. For example, an Israeli survey revealed that health literacy among older adults is slightly inadequate (Hochhauser et al., 2019). Furthermore, findings from the European Health Literacy Survey indicated that individuals over 66 years of age scored lower in health literacy assessments (Sørensen et al., 2015). Limited health literacy in older adults can lead to risky habits and a lack of effective coping and management skills when facing health problems (Hochhauser et al., 2019; Liu et al., 2015), which in turn affects their health status. Thus, it becomes imperative to explore how to improve older adults' health literacy.

With the rapid development of information technology, new media products such as short videos are becoming one of the most important ways for health information acquisition (Xu et al., 2025). Older adults are also increasingly influenced by short videos in shaping their health literacy levels. Compared to text or images, short videos have become an important medium for the elderly to learn about health information due to their brevity, entertainment, vividness, and engaging visuals. Consequently, health science short videos have the potential to enhance the health literacy of older adults. Health science short videos have not developed a uniform terminology. For example, they are also referred to as health outreach short videos or health communication short videos (Zhu et al., 2023). However, scholars generally agree that health science short videos disseminate health information about healthy eating and lifestyle, disease prevention, and other topics to the public in a simple and understandable way (Xiao et al., 2023). As a result, older adults are likely to encounter health science information through short videos. This phenomenon aligns with the concept of information encountering, which is a form of opportunistic acquisition of information characterised by the serendipitous discovery of interesting and useful information without a specific search intent (Erdelez, 2004).

The existing literature exhibits the following research gaps. First, research on outcomes of information encountering in the health domain has not attracted considerable scholarly attention. While some literature has begun to examine the outcomes (Chen et al., 2024; Erdelez et al., 2024), the literature remains limited and does not specifically address health information. This gap impedes a mechanistic understanding of how information encountering fosters improvements in health literacy and health behaviours. Therefore, investigating the outcomes of information encountering through health science short videos is necessary. Second, there remains a lack of research exploring the effect of health information encountering on health literacy among older adults. Previous studies on health literacy and information behaviours have predominantly focused on proactive health information seeking (Kim & Utz, 2018; Yi et al., 2021). Although some literature suggests that incidental exposure to health information may have an impact on health-related behaviours (Liu et al., 2023; Shim et al., 2006), the impact of this encountering on health literacy among older adults has not been explored. The health literacy level of older adults has a direct impact on their mortality rates, making it a critical characteristic that demands attention. As there may be a correlation between the explanatory variables and the error term in the regression equation, it may potentially lead to endogeneity issues (Zaefarian et al., 2017). Hence, we used the propensity score matching method to reduce the impact of potential endogeneity problem in the regression model.

This study used a survey method to collect data and employed a propensity score matching technique based on traditional ordinary least squares regression to examine the effect of health science short video information encountering on health literacy among older adults. The findings not only address the research gap regarding the impact of health-related information encountering on older adults' health literacy but also provide new insights to enhance the health literacy level of the elderly.

Literature review

Health literacy and health information behaviour

Health literacy is broadly defined as an individual's ability to access, understand, and use information for the health of individuals, families, and communities (World Health Organization, 2024). It suggests that health literacy is related to an individual's health-informed behaviour. Based on Wilson's definition of information behaviour, it can be classified into two forms of information behaviour: purposeful information seeking and serendipitous information discovery and exposure (Montazeri, 2025; Wilson, 2000). The existing literature has investigated the relationship between health literacy and health information seeking. For instance, Kim and Utz (2018) confirmed the important role of health literacy in fostering health information seeking among older adults. Yi et al. (2021) employed the rapid estimate of adult literacy in medicine to measure individuals' health literacy, and found that literacy played an important role in individuals' health information seeking, especially their choice of the information sources. A systematic literature review on the online health information seeking behaviours of older adults reported that health literacy is one of the 12 individual-related characteristics, and it has a significant impact on older adults' online health information seeking behaviours (Zhao et al., 2022). Online health information seeking can also affect health literacy. Through a cross-sectional study, Zhao et al. (2024) reported that seeking behaviour was positively associated with an individual's digital health literacy. Afifi et al. (2025) focused on the health information behaviour of Generation Z females and explored its relationship with e-health literacy.

The proliferation of the internet has led to an increased frequency of incidental information encounters. Liu et al. (2023) pointed out that the food-and-nutrition information encountering can influence an individual's choice of healthier foods and make them healthier. Bigsby and Hovick (2018) investigated the effect of health information scanning on risky health behaviours. Zhang et al. (2024) discovered that health information scanning was positively associated with lung cancer screening among smokers, with e-health literacy serving as a moderating variable. Lai et al. (2025) empirically validated that online cancer information scanning behaviour has a positive impact on individuals' willingness to receive human papillomavirus vaccines. Based on the existing literature, we can infer that health-related information encountering may influence health behaviour, but its positive impact on health literacy is unverified. Meanwhile, research has demonstrated that health literacy has an impact on both physical and mental health (Rikard et al., 2016). In fact, researchers have used health literacy as an antecedent to explore its impact on health information behaviours (Fleary et al., 2018; Kim et al., 2023; Kim & Utz, 2018), while neglecting that health information behaviours can also affect health literacy. Given the importance of health literacy, it is necessary to study the impact of health information encountering on health literacy.

Online information encountering

Information encountering, first coined by Erdelez, is regarded as a form of unplanned or unanticipated access to information, which can occur during both information seeking and browsing (Erdelez, 1999; Erdelez & Makri, 2020). Simultaneously, the frequent use of social media makes it common to experience information encountering (Jiang et al., 2015). Most of these studies mainly examined either the influencing factors of information encountering or its process model.

The influencing factors of information encountering experience have been discussed. Erdelez (1999) summarised four fundamental factors, which are: information user, environment, information encountered and information needs. Jiang et al. (2015) further employed the critical incident technique based on the grounded theory approach to extract three overarching influencing factors, including users, information and environment. Makri and Buckley (2020) identified factors that interrupt or impede the process of information encountering behaviour. Sun et al. (2022) discussed the influence of emotions, highlighting that positive emotions can enhance information encountering experience. In addition to influencing factors, scholars have extensively

examined its process. Erdelez (1999) proposed the framework of the information encountering process, which includes noticing, stopping, examining, storing and returning. Jiang et al. (2022) developed an integrated model of information encountering by considering the stage before, during and after encountering, and they discussed the detailed behaviour of users at each stage. Awan et al. (2020) introduced an extended model incorporating general browsing as a significant facilitator of information encountering process. Kim et al. (2025) operationalised individuals' online information encountering tendency based on five core dimensions of the Erdelez's process model of information encountering. While information encountering as an outcome variable is well established in literature, research on the consequences of pervasive information encountering remains an emerging area of study.

The literature review reveals that existing studies have primarily investigated the relationship between active health information behaviours and health literacy, failing to examine the relationship between health science information encountering and health literacy. Furthermore, quantitative investigations into the impacts and outcomes of health science information encountering remain scarce. Given that older adults represent a crucial population exposed to online health information, this study proposes the following hypothesis:

Health science short video information encountering has a positive impact on the health literacy of older adults.

Methods

Data sources

The data were collected using an offline survey. This survey used a mixed sampling strategy, integrating both random sampling and snowball sampling techniques. Specifically, questionnaires were randomly distributed to eligible elderly individuals across all communities within the study area. At the same time, the snowball sampling method was utilised, whereby participants were encouraged to refer additional potential respondents to increase the sample size.

The questionnaire was divided into four parts. The first part outlined the research purpose, data confidentiality statement, and voluntary participation principle. The second part focused on cognitive testing, utilising inquiries about the date and weather of the current day to conduct a cognitive evaluation of older adults. The third part was the measurement items of all control variables. The fourth part included the measurement of health science short video information encountering and the health literacy scale. In this part, we also added an embedded attention detection question (please choose 'very easy') to ask respondents to choose the item as requested.

Participants were recruited through several communities in China, and they were required to meet the following criteria: 1) participants aged ≥ 60 years old (Federman et al., 2009); 2) participants voluntarily participated in the research study; and 3) participants had experience in short videos. Furthermore, we promised to provide a gift as an incentive for valid responses. The survey was conducted in two stages. The first stage was the pre-test stage, in which the questionnaire was sent to 20 elderly people to complete. The language and design of the questionnaire were modified based on their feedback to reduce comprehension difficulties for older adults. The second stage was the formal survey stage. Participants were required to complete the questionnaire independently. For those who could not complete the questionnaire on their own, we read the questions for them and helped them fill out the questionnaire without interfering with their choice. The survey was conducted from February 1, 2024 to February 20, 2024. A total of 347 responses were collected. As the pilot test showed that this questionnaire required more than 120 seconds to complete, we eliminated questionnaires with response times of less than 120 seconds. Additionally, this study also removed questionnaires from respondents who did not choose the required item in the attention detection question. After excluding invalid questionnaires and those with a repetition rate of more than 95% of the answers, we finally obtained 306 valid responses.

Variables measurement

Dependent variable

The dependent variable is the health literacy of older adults. Health literacy was measured by the European health literacy survey questionnaire short form (Finbråten et al., 2018; Imeri et al., 2024). The questionnaire consists of one question item for each of the 12 dimensions, which cover the three health environments (health care, disease prevention and health promotion) and the four cognitive domains (access, understand, appraise and apply). It reflects the conceptual framework of health literacy well. In addition, a 12-item questionnaire can reduce the cognitive load on older adults and improve both participation and the quality of questionnaire responses. Therefore, the scale was chosen to measure health literacy among older adults in this study.

Independent variable

Individuals' experiences of health science short video information encountering were measured with a single dichotomous item to serve as the treatment variable for propensity score matching. The question was formulated to capture the core elements of Erdelez's (1999) conceptualisation: 'When you are routinely browsing short video platforms, and not actively searching for health knowledge, have you ever unexpectedly come across short videos about physical health, disease prevention, or nutrition that you found interesting or useful?' (Yes=1, No=0) (Erdelez, 1999; Kim et al. 2025; Lu et al., 2023).

Control variables

The following variables were chosen as control variables based on prior studies: 1) Demographic variables, which include gender, age, area, educational level, employment status, marriage status, living style, chronic diseases, and medical insurance (Chiu et al., 2020; Estacio et al., 2019; Jiang et al., 2015). 2) Frequency of social media use and online health information seeking experience may affect health literacy (Ghaddar et al., 2012; Paek et al., 2011). At the same time, internet use and information searching will affect individual information encountering behaviour (Awan et al., 2019; Jiang et al., 2015). Social media use was measured by asking respondents how much time they spent daily on social media live streaming, short videos, and image-text posts. This item used a five-point Likert scale (1=less than 30 minutes, 2=30-60 minutes, 3=60-90 minutes, 4=90-120 minutes, 5=greater than 120 minutes). Frequency of health information seeking was evaluated using the same scale (1=0 times, 2=1-2 times, 3=3-4 times, 4=5-7 times, 5=8 or more times) to quantify how often participants searched for online health-related content in the last seven days. 3) Self-assessed health status has been shown in several studies to influence an individual's health literacy (Cutilli et al., 2018; Federman et al., 2009; Liu et al., 2015). Self-assessment of health is measured by asking respondents to rate their overall health as good, fair, or poor.

This study also tests the reliability and validity of the measurement items for social media use and health literacy variables. Firstly, the model demonstrates a good fit to the data, as evidenced by the following statistics: $\chi^2/df = 2.589$, comparative fit index (CFI) = 0.939, root mean square error of approximation (RMSEA) = 0.072, normed fit index (NFI) = 0.905, tucker-lewis index (TLI) = 0.926. Secondly, the health literacy scale is a short version tool of the European Health Literacy Survey and its reliability has been validated in multiple studies (Finbråten et al., 2018; Zanini et al., 2023). Furthermore, Table 1 shows the reliability and validity of the instrument. The results showed that all items loaded high on their respective constructs (> 0.6) and the composite reliability (CR) for each construct was greater than 0.7. The values of average variance extracted (AVE) for health literacy was 0.482, which approximated the threshold of 0.50 (Li et al., 2018; Maruf, 2021; Yin, 2018; Zhang & Zheng, 2021). As the instrument of health literacy is a mature one and has been validated in prior studies, we believe that 0.482 is acceptable. Hence, the validity was acceptable.

Construct	Item	Standard loading	Cronbach's α	AVE	CR
Social media use	USE1	0.726	0.802	0.589	0.809
	USE2	0.674			

	USE3	0.886			
Health literacy	HL1	0.774	0.919	0.482	0.918
	HL2	0.698			
	HL3	0.692			
	HL4	0.676			
	HL5	0.742			
	HL6	0.648			
	HL7	0.682			
	HL8	0.669			
	HL9	0.741			
	HL10	0.719			
	HL11	0.627			
	HL12	0.651			

Table 1. Reliability and validity testing.

Research design

The research design consisted of several stages. Stage 1 involved a benchmark regression. The benchmark regression used the ordinary least squares regression model to test the relationship between health science short video information encountering and health literacy among older adults. Stage 2 used propensity score matching method to verify the effect of information encountering on health literacy and reduce the effects of self-selectivity bias and confounding variables. It is a matching method proposed by Rosenbaum and Rubin (1984). It is used to estimate the effect of the independent variable on the dependent variable when it is made consistent by controlling for other variables. This method controls the treatment and control groups in a balanced way by calculating propensity scores of observable confounding variables. Two samples are comparable if their propensity scores are equal or similar (Dong et al., 2023). Stage 3 involved a regression after matching to test the robustness of the results from the baseline regression analysis and propensity score matching analysis. The research process is shown in Figure 1.

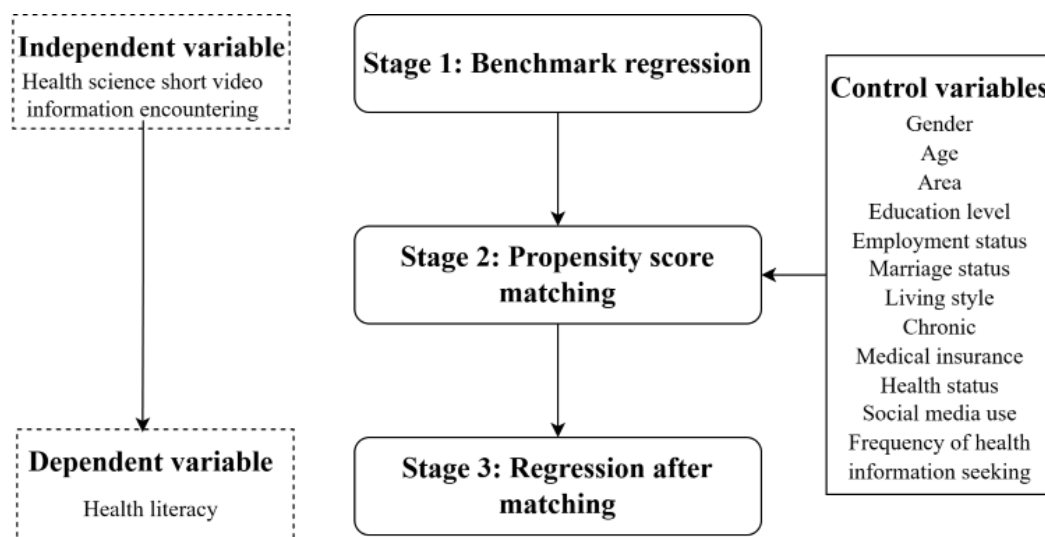


Figure 1. Research process.

Results

Analysis of sample characteristics

This study investigated the impact of information encountering through health science short videos on the health literacy of older adults. This analysis began with descriptive statistics of the sample, followed by a benchmark regression analysis and a robustness test using propensity score

matching technology. Finally, another regression analysis based on the matched sample was conducted.

Table 2 presents the results of the descriptive statistical analyses of the demographic variables. The average age of participants was 68.13 years old, with the oldest being 93 years old and the youngest being 60 years old. The proportion of women among the respondents is 50.65%, indicating a relatively balanced ratio between males and females. Among the sample, 55.23% of households lived in urban areas. The respondents generally had a low level of education, with 71.89% possessing only a high school or lower educational level. Most respondents were retired, accounting for 81.37%, while only 18.63% were still working. Additionally, 71.24% respondents reported that they had experienced health science short video information encountering (71.24%). They demonstrated a relatively high level of health literacy, with a mean score of 38.28 out of a possible 60 (12 items, 5 points each). The high self-assessment score may be due to participants' tendencies to embellish their health status or overestimate their level of health literacy when completing the questionnaire.

Variables	Levels	N (%)
Gender	Female	155 (50.65%)
	Male	151 (49.35%)
Age	60-69	201 (65.69%)
	70-79	75 (24.51%)
	≥80	30 (9.80%)
Area	Urban	169 (55.23%)
	Rural	137 (44.77%)
Education level	High school and below	220 (71.89%)
	Junior college and above	86 (28.11%)
Employment status	Retired	249 (81.37%)
	Still working	57 (18.63%)
Marriage status	Married	243 (79.41%)
	Unmarried or divorced	63 (20.59%)
Living style	Alone	70 (22.88%)
	With family	236 (77.12%)
Chronic	Yes	153 (50.00%)
	No	153 (50.00%)
Medical insurance	Yes	243 (79.41%)
	No	63 (20.59%)

Table 2. Descriptive statistical results of all samples (N = 306).

Benchmark regression analysis

The first step is to conduct correlation analysis. The results in the form of a matrix diagram are shown in Figure 2. The size of the circles and the shade of the colours in Figure 2 reflect the differences in the strength of the correlation. The numbers in the lower half of Figure 2 are correlation coefficients. The rightmost axis explains the meaning of the legend, with darker blue colours in the circle representing stronger positive correlations, and darker red colours indicating stronger negative correlations. health science short video information encountering is positively correlated with health literacy and can be used for further regression analysis. The result of the correlation analysis shows that the correlation coefficients between the variables are less than 0.7, indicating that there is no multicollinearity (Senthilnathan, 2019).

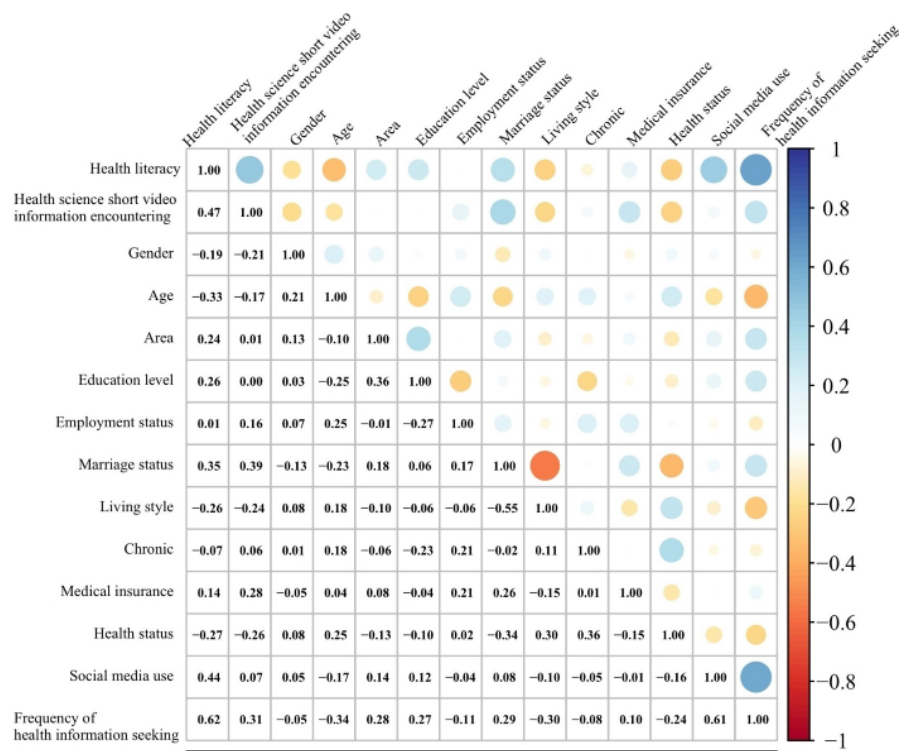


Figure 2. Correlation of variables.

The second step is to use the ordinary least squares regression model to conduct benchmark regression analysis on the whole sample. The results of the benchmark regression model are shown in Table 3. It can be seen that health science short video information encountering is positively and significantly associated with health literacy and the hypothesis is supported ($\beta=0.283$, $P<0.01$). This indicates that older adults with health science short video information encountering experience have higher health literacy. In demographic variables, gender and education level significantly affect health literacy. Specifically, older adults who are female ($\beta=-0.119$, $P<0.01$) or have high education levels ($\beta=0.117$, $P<0.01$) demonstrate significantly higher health literacy. The results further show that increased social media usage time is positively associated with higher health literacy levels among older adults ($\beta=0.197$, $P<0.01$). Additionally, the frequency of health information seeking is positively and significantly associated with older adults' health literacy ($\beta=0.317$, $P<0.01$).

Variables	Health literacy			
	Beta	Robust std. err	t value	P value
HSSV-information encountering	0.283	1.038	5.68	0.000
Gender	-0.119	0.821	-2.74	0.007
Age	-0.070	0.061	-1.50	0.134
Area	0.067	0.939	1.36	0.176
Education level	0.117	0.383	2.72	0.007
Employment status	0.062	0.968	1.55	0.121
Marriage status	0.078	1.318	1.39	0.167
Living style	0.016	1.069	0.33	0.739
Chronic	-0.018	0.865	-0.39	0.697
Medical insurance	-0.011	0.958	-0.26	0.795
Health status	-0.017	0.637	-0.36	0.717
Social media use	0.197	0.655	3.67	0.000
Frequency of health information seeking	0.317	0.524	5.14	0.000
Constant	21.518			
Observations	306			
R-squared	0.537			
F test	0			
r2_a	0.516			
F	29.40			

Table 3. The results of the benchmark regression model (N=306).

Propensity score matching analysis

Following the benchmark regression, we used propensity score matching technique for random sample matching to reduce the effects of omitted and confounding variables and to test the benchmark regression results. As the observed variable is dichotomous, a binary logit model was constructed to calculate the propensity scores.

In the first step, we calculated the propensity score. The results of the logit model are displayed in Table 4. According to Table 4, gender had a significant influence on health science short video information encountering. Females were more likely to encounter health science short videos than males ($P < 0.01$). Rural residents tended to have a higher tendency to experience health science short video information encountering ($P < 0.05$). Retired older adults were more likely to experience health information encountering in short videos than respondents who were still working ($P < 0.05$). Also, married respondents had health science short video information encountering experience more often than unmarried or divorced respondents ($P < 0.05$). Those who had a chronic disease ($P < 0.05$) and poorer health status ($P < 0.01$) were more likely to experience health science information encountering in short videos. Respondents who had purchased medical insurance also reported more health science short video information encountering ($P < 0.01$). Frequency of health information seeking was positively and significantly associated with health science short video information encountering ($P < 0.01$), whereas social media use demonstrated a negative and significant impact ($P < 0.05$).

Variables	Coefficient	Std. err.	z	P value
Gender	-0.908	0.327	-2.77	0.006
Age	-0.008	0.025	-0.32	0.752
Area	-0.709	0.360	-1.97	0.049
Education level	-0.020	0.176	-0.11	0.911
Employment status	0.992	0.428	2.32	0.021
Marriage status	1.106	0.437	2.53	0.011
Living style	0.129	0.432	0.30	0.765
Chronic	0.753	0.363	2.08	0.038
Medical insurance	1.012	0.370	2.73	0.006
Health status	-0.708	0.252	-2.81	0.005
Social media use	-0.686	0.290	-2.37	0.018
Frequency of health information seeking	0.960	0.217	4.43	0.000
_cons	0.040	1.990	0.02	0.984

Table 4. Logistic regression of control variables

In the second step, we matched the samples of the treatment and control groups. Based on the sample size and subgroups, a combination of one to two nearest-neighbour matching and caliper matching was chosen in this study. The caliper threshold was set at 0.02.

In the third step, we conducted a balance check to check the matching quality. In this study, absolute standardised bias was used to assess match quality. The results of the balance test are displayed in Table 5. According to Stuart (2010), the absolute standardised bias should be less than 0.25. The results in Table 5 showed that the standardised bias of both the treatment and control groups after matching was controlled below 20%. Meanwhile, the t-test results of all variables after matching were not significant, indicating that the matching effectively balanced the differences between the treatment and control groups. In addition, Figure 3 illustrates the distribution of propensity scores for the treatment and control groups before and after matching. As shown in the figure, the samples before matching have overlapping common support regions. After matching, the overlapping region of propensity scores expands, and the kernel density curves of the treatment and control groups become more consistent. Therefore, we believe that the matching passes the balance test well.

Variables	Unmatched Matched	Mean		%bias	%reduct bias	t-test	
		Treated	Control			t	P value
Gender	U	0.427	0.659	-47.8	76.0	-3.75	0.000
	M	0.508	0.564	-11.5		-1.06	0.291
Age	U	67.367	70.023	-34.8	57.1	-2.97	0.003
	M	67.402	66.263	14.9		1.64	0.101
Area	U	0.555	0.545	1.9	-162.1	0.15	0.879
	M	0.592	0.617	-5.0		-0.49	0.628
Education level	U	1.986	1.977	0.9	-273.9	0.07	0.947
	M	2.089	2.056	3.2		0.32	0.750
Employment status	U	0.853	0.716	33.7	61.3	2.82	0.005
	M	0.821	0.768	13		1.24	0.215
Marriage status	U	0.895	0.545	84	92.0	7.40	0.000
	M	0.871	0.899	-6.7		-0.83	0.408
Living style	U	0.165	0.386	-50.9	98.7	-4.28	0.000
	M	0.190	0.187	0.6		0.07	0.946
Chronic	U	0.518	0.455	12.7	-5.1	1.01	0.314
	M	0.475	0.408	13.4		1.28	0.203
Medical insurance	U	0.867	0.614	60.1	89.0	5.16	0.000
	M	0.844	0.871	-6.6		-0.75	0.451
Health status	U	1.670	2.080	-56.4	81.6	-4.61	0.000
	M	1.749	1.673	10.4		0.95	0.344
Social media use	U	2.896	2.784	14.6	87.2	1.14	0.254
	M	2.927	3.005	-10.1		-0.87	0.387
Frequency of health information encountering	U	3.298	2.534	67.1	31.0	5.71	0.000
	M	3.196	3.293	-8.6		-0.76	0.447

Table 5. The results of the balance test.

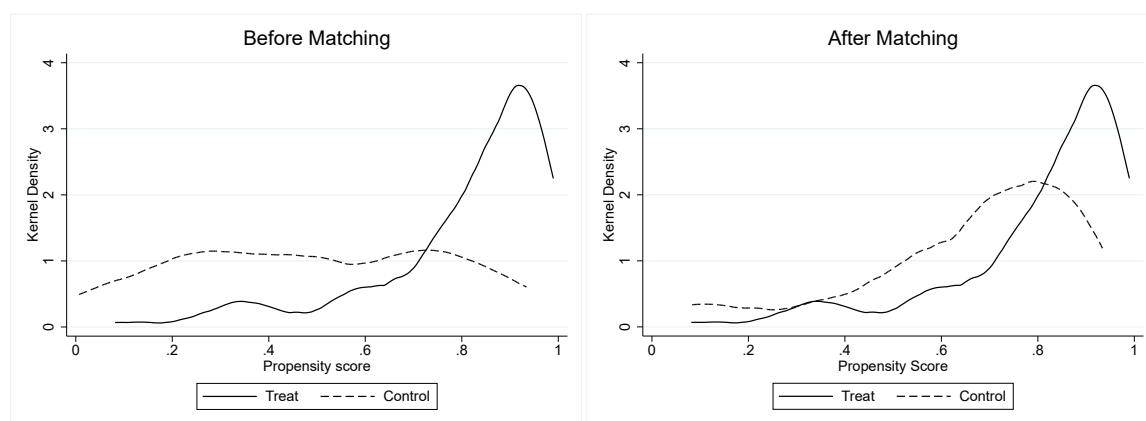


Figure 3. Distribution of propensity scores before and after matching.

Finally, Table 6 shows the results of the estimated average treatment effect on the treated (ATT) of health literacy among older adults resulting from health science short video information encountering. The average treatment effect on the treated results demonstrate that the pre-

matching effect of health science short video information encountering on health literacy among older adults is significant at the 1% level (T-stat= 9.26 > 2.56). After propensity score matching, a reduction in the mean difference between the eigenvalues of the treatment and control groups is observed. The T-value of 2.31 indicates that the effect of health science short video information encountering on the health literacy of the elderly is significant at the 5% level.

Variable	Sample	Treated	Controls	Difference	S.E.	T-stat
Health literacy	Unmatched	41.095	31.303	9.792	1.058	9.26***
	ATT	40.916	35.829	5.088	2.207	2.31**

Table 6. The results of the average treatment effect on the treated

Regression analysis after matching

Propensity score matching technique was used to eliminate potential selection bias between the treatment and control groups and to test the effect of health science short video information encountering on health literacy. Therefore, regression analysis using the matched data was performed in this section to verify the robustness of the baseline regression and propensity score matching results. Table 7 shows the demographic characteristics of the matched samples. The results of the regression analysis are presented in Table 8. According to the regression results, it can be found that health science short video information encountering still has a positive, significant and robust association with health literacy of the elderly ($\beta=0.297$, $P<0.001$). This means that older adults who have health information encountering related experience may have a higher level of health literacy than those who do not have such experience. The regression results for the three models are validated in both the baseline regression model and the propensity score matching method.

Variables	Levels	N (%)
Gender	Female	114 (46.53%)
	Male	131 (53.47%)
Age	60-69	162 (66.12%)
	70-79	59 (24.08%)
	≥80	24 (9.80%)
Area	Urban	142 (57.96%)
	Rural	103 (42.04%)
Education level	High school and below	211 (86.12%)
	Junior college and above	34 (13.88%)
Employment status	Retired	197 (80.41%)
	Still working	48 (19.59%)
Marriage status	Married	201 (82.04%)
	Unmarried or divorced	44 (17.96%)
Living style	Alone	52 (21.22%)
	With family	193 (78.78%)
Chronic	Yes	114 (46.53%)
	No	131 (53.47%)
Medical insurance	Yes	196 (80.00%)
	No	49 (20.00%)

Table 7. Descriptive statistical results of matched samples (N = 245).

Variables	Health literacy			
	Beta	Robust std. err	T value	P value
HSSV-information encountering	0.297	1.093	5.59	0.000
Gender	-0.181	0.925	-3.59	0.000
Age	-0.008	0.064	-0.17	0.866
Area	0.051	1.044	0.90	0.368
Education level	0.124	0.422	2.50	0.013
Employment status	0.063	1.079	1.33	0.183
Marriage status	0.092	1.368	1.60	0.111
Living style	-0.024	1.147	-0.47	0.638
Chronic	0.015	0.947	0.28	0.779
Medical insurance	0.026	1.007	0.58	0.564
Health status	-0.020	0.664	-0.38	0.707
Social media use	0.175	0.782	2.68	0.008
Frequency of health information seeking	0.382	0.629	5.14	0.000
Constant	14.806			
Observations	245			
R-squared	0.551			
F test	0			
r2_a	0.526			
F	22.95			

Table 8. The results of regression analyses based on matched data.

Discussion

Principal findings

Our findings support the hypothesis that health science short video information encountering has a positive association with the health literacy of older adults. Specifically, older adults who have engaged with such content exhibited higher health literacy than non-engagers. The clues in previous studies indicate that the health-related information encountering and scanning can have an impact on an individual's health behaviour (Liu et al., 2023; Zhang et al., 2024). This study focuses on health information encountering in short videos and verifies this through empirical analysis. Consistent with previous research, health science short videos are particularly effective in facilitating health information access for individuals with lower health literacy (Xiao et al., 2023). Therefore, these results support the hypothesis that health science short video information encountering is linked to improved health literacy in older adults. Moreover, the propensity score matching analysis yielded results consistent with the baseline regression model.

Additionally, this study reveals that older adults frequently experience health science short video information encountering. Short video platforms have emerged as a major health information source for older adults. In our sample, 71.24% (218/306) of respondents reported health science short video information encountering experience. These platforms now serve as powerful tools for health information dissemination and health knowledge popularisation. Through these channels, health-related information encountering enhances older adults' health knowledge, deepens their health understanding, and ultimately improves their health literacy.

This study also finds that female older adults have higher health literacy than the male. This gender difference may stem from traditional family roles in China, where women are typically responsible for caregiving and health-related matters, making them more attentive to health information. Furthermore, education level also has positively and significantly relationship with health literacy among older adults. Additionally, both social media use and health information seeking frequency positively influence health literacy levels. Potential reasons lie in that frequent social media use and health information seeking increase older adults' exposure to health-related content, thereby enhancing their health knowledge and literacy. The non-significant relationship between

traditional health variables (such as employment status, living style and medical insurance) and older adults' health literacy indicates that the experiential learning paradigm of health science short video information encountering maybe dissolves the inherent influence of some biomedical and institutional safeguards factors. It is also worth noting that compared with frequency of health information seeking, health science short video information encountering may have a greater impact on health literacy.

Meanwhile, we found that older adults who are female, in rural areas, retired, married, and have chronic diseases, poorer health, medical insurance, and high health information seeking frequency are more likely to experience health science short video information encountering. This may be attributed to the fact that older women tend to act as health leaders in their families (Ramirez, 2015). Therefore, the platform may recommend more health science short videos to older women based on algorithmic recommendations. As well, the combination of close-knit social networks, limited access to formal information sources, and context-dependent information needs makes rural elderly more likely to experience information encounters (Chilimo et al., 2011). Retired older adults may be much more likely to encounter health information because they have more time to spend on social media platforms. Similarly, older people with chronic illnesses and poorer health are more likely to focus on health information. Additionally, older adults with lower social media usage frequency are more likely to experience health science short video information encountering. Older adults with these traits represent a high-frequency group of people searching for health information as well as paying attention to health information, which makes them experience more health science short video information encountering. In addition, elderly adults with limited social media usage may typically acquire health information through passive scanning rather than active seeking behaviours.

Implications

By investigating the impact of health science short video information encountering on the health literacy of older adults, this study has several theoretical implications. First, this study extends the literature on information encountering by examining its impact in health area. Prior research mainly focuses on its influencing factors and process modelling, ignoring the potential outcomes of information encountering (Chen et al., 2024). Considering information encountering as a primary source of older adults' health information (Erdelez & Makri, 2020), it is essential to examine its impact. Our findings confirm the positive impact of health science short video information encountering on the health literacy of older adults and clarify the effects of health information encountering, making a complement to the existing work.

Secondly, this study enriches the theoretical understanding of information encountering in the context of the elderly's digital experience. Previous research has largely overlooked older adults as a digital immigrant group, with studies predominantly focusing on younger internet users as research subjects (Awan et al., 2019; Jiang et al., 2019). However, the penetration of the Internet has a particularly pronounced impact on older adults. By demonstrating the positive effect of health science short video information encountering on health literacy, this study reveals that the adults, despite potential digital barriers, can still benefit from unplanned information discovery.

Finally, this study contributes to health literacy research by highlighting the important role of health information encountering in driving the development of health literacy. This study tests the robustness of the benchmark regression results based on the propensity score matching approach to reduce the effect of confounding variables and sample selection bias. This technique thus reveals a crucial causal mechanism between the frequency of health information seeking and health science short video information encountering. Furthermore, this study highlights the importance of passive health information encountering for improving health literacy. While health information seeking remains crucial, the finding that health science short video information encountering exerts a stronger impact on health literacy ($\beta=0.317$, $P<0.001$; $\beta=0.283$, $P<0.001$)

reveals the significant role of passive information acquisition channels in the contemporary media landscape, particularly algorithm-driven short video platforms. Therefore, this study provides a theoretical foundation to understand health information seeking, health science short video information encountering and health literacy for future research among older adults.

This study has practical implications as well. First, this study emphasises that short videos are an important platform for conducting health education and disseminating health information for older adults. The health-related information that older adults encountering on short videos can have a positive impact on their health literacy. Health science short videos have unique potential as an alternative communication channel for this group. Therefore, practitioners need to acknowledge the importance of short video platforms in disseminating health information and health scientific knowledge.

What's more, content creators can produce more high-quality health science videos targeting diverse audiences, including personalised content catering to users' demand for comprehensive health information and enhancing the accessibility of health information encountering. For example, medical professionals should create authoritative health short videos to disseminate knowledge on disease prevention and clarify prevalent health misinformation. Ordinary people can also share their personal illness stories and treatment processes on short video platforms. Platforms can further enhance the serendipitous discovery experience by refining recommendation algorithms, ensuring that health-related videos are more likely to surface in the feeds of elderly users. This helps reduce the risk of disease and improve the quality of life of older adults, contributing to a healthier and more active aging environment in society.

Limitations and directions for future research

This study has several limitations that merit future studies. Firstly, this study collected 306 valid samples to test the relationship between health science short video information encountering and health literacy. Given the challenges of data collection from elderly populations, we recommend future studies employ larger samples to validate these findings. Second, the exclusive reliance on offline survey methods presents another limitation. Future research could incorporate mixed-method approaches, such as in-depth interviews or analysis of secondary data, to provide more comprehensive validation of our hypotheses.

Conclusion

With the rapid evolution of social media platforms and the proliferation of online socialisation, users' frequency of information encountering has increased substantially. Within this digital landscape, health science content has emerged as a significant component of information encountering. Therefore, this study uses ordinary least squares regression and propensity score matching method to verify the effect of health science short video information encountering on the health literacy of older adults. The findings show that health science short video information encountering plays an important role in promoting health literacy among older adults. This study not only enriches the theoretical research on the relevant content but also supports the work of health science staff and social media platforms.

Acknowledgements

This work is supported by the National Social Science Fund of China project (No.24BTQ065).

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