Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Current status and influencing factors of online health information seeking behavior in elderly stroke patients : a cross-sectional potential profile analysis

yaqi pang
Second Affiliated Hospital of Dalian Medical University
jiale wang
Second Affiliated Hospital of Dalian Medical University
ning jin
Second Affiliated Hospital of Dalian Medical University
shuliang Chen
csliang19800@dmu.edu.cn

Second Affiliated Hospital of Dalian Medical University

Article

Keywords: Stroke, Elderly, Online health information, Influencing factors, latent profile analysis

Posted Date: November 1st, 2026

DOI: https://doi.org/10.21203/rs.3.rs-11241404/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License. Read Full License

Additional Declarations: No competing interests reported.

Abstract

Background

Owing to its abundant information resources, convenient accessibility,and low cost of use,the Internet has become an important channel for patients to obtain health-related information.Access to sufficient online health information enables patients to manage their diseases more effectively,thereby reducing disease risk and improving health outcomes.However,studies on online health information-seeking behavior among elderly stroke patients remain limited.This study aimed to examine the current status and latent profile characteristics of online health information-seeking behavior among older stroke patients and to explore its influencing factors,thereby providing a reference for the development of individualized intervention strategies.

Methods

A cross-sectional study was applied between January and July 2025.A total of 327 elderly stroke participants hospitalized in the Department of Neurology of The Second Affiliated Hospital of Dalian Medical University were recruited as study participants.A general information questionnaire,Internet Health Information Seeking Behaviour,eHealth Literacy Scale,Patient Activation Measure scale,Perceived Social Support Scale,and General Self-Efficacy Scale were used to investigate. Latent profile analysis was performed to explore potential subtypes of online health information-seeking behavior,and multinomial logistic regression analysis was used to examine the influencing factors associated with different latent profiles.

Results

Online health information-seeking behavior among elderly stroke patients was at a relatively low level.Three latent profile subtypes were identified:the “information apathy type”(48.0%), the“moderate attention type”(35.2%),and the“proactive inquistive type”(16.8%).Patient age,education level,monthly family income,eHealth literacy,patient activation,perceived social support,and self-efficacy were predictors of potential online health information-seeking behavior typology in elderly stroke patients($P < 0.05$).

Conclusion

Heterogeneity exists in online health information-seeking behavior of elderly stroke patients, and this behavior is influenced by multiple factors. Healthcare professionals should take targeted intervention strategies based on different potential profile typology to improve online health information-seeking behavior in this population.

Introduction

Stroke is an acute cerebrovascular disease caused by the sudden rupture or occlusion of cerebral blood vessels,resulting in impaired cerebral blood flow and subsequent brain tissue damage[1].As a common chronic disease, stroke is characterized by high morbidity,high disability,high mortality,high recurrence, and high economic burden.It is currently the second leading cause of death worldwide,accounting for 11.6% of total deaths,posing a serious threat to human health,particularly among elderly[2].According to the Summary of the China Cardiovascular Health and Disease Report 2024[3],approximately 26.34 million people in China are living with stroke.Approximately

80% of stroke survivors experience varying degrees of dysfunction[4-7].For elderly stroke patients,post-discharge rehabilitation,secondary prevention,and complication management often require long-term and continuous health guidance.

With the rapid development of information technology and digital healthcare,older adults have gradually shifted from passively receiving health information through physicians and mass media to actively obtaining health-related information through Internet searches[8].Online health information-seeking behavior refers to the practice in which individuals proactively search for health-related knowledge via Internet-based media platforms[9].Previous studies have demonstrated that online health information-seeking behavior can help older adults understand disease symptoms,assess disease risks,identify treatment options,manage chronic conditions,and prepare for physician–patient communication[10].At present,research on online health information-seeking behavior in China and internationally has primarily focused on college students,older adults,and patients with chronic diseases[11-14],whereas studies involving older stroke patients remain limited.Moreover,most previous studies have relied on total scale scores to assess the level of health information-seeking behavior,while neglecting the heterogeneity among individuals.

Given that the level of health information-seeking behavior is shaped by the combined influence of multiple factors,this study employed latent profile analysis to further explore the complexity and heterogeneity of online health information-seeking behavior among older stroke patients. Specifically,this study aimed to identify potential profile characteristics of online health information-seeking behavior in this population and to further examine their influencing factors.The findings may provide a scientific basis for accurately identifying high-risk behavioral profile groups and for developing and implementing stratified,targeted, and individualized interventions to promote online health information seeking and health management.

Methods

1.1Research subjects

This study adopted a cross-sectional study.From January 2025 to July 2025,using the convenience sampling method,patients with stroke who were hospitalized in the Department of Neurology of The Second Affiliated Hospital of Dalian Medical University were selected as the research subjects.Sample size inclusion criteria:(1) aged 60–80 years;(2)meet the diagnostic criteria for stroke according to the Diagnostic Criteria for Major Cerebrovascular Diseases in China 2019[15],with stroke confirmed by cranial Computed Tomography or Magnetic Resonance Imaging;(3) voluntarily participated in the study and provided informed consent;(4)Possessing basic internet-use ability.Exclusion criteria:(1)critically ill patients who were unable to cooperate with the investigation; (2)patients with severe visual or hearing impairments or severe physical illnesses;(3)Investigate those who quit halfway.According to Kendall's[16]method for calculating sample size,the sample size should be 5 to 10 times the number of variables.This study contains 20 variables,and considering a 20% sample loss rate, the sample size should be 120 to 240 cases. A total of 335 questionnaires were distributed in this study,and 327 valid questionnaires were ultimately recovered,with an effective questionnarie recovery rate of 97.61%.

1.2Research tools

1.2.1General information questionnaire

The researcher designed the quetionnarie by himself through reviewing the literature,including patients'gender,age,educational level,current or pre-retirement occupation,place of residence,monthly family

income,marital status,primary caregiver,first-ever stroke status,type of stroke, number of chronic comorbidities,and stroke severity.(For details,please refer to Supplementary Material 1.)

1.2.2 Internet Health Information Seeking Behaviour(IHISB)

This scale was compiled by Wang Ziyue[17]in 2017 and revised by Zhu Yaru[18]to assess an individual's online health information-seeking behavior. The scale includes 5 dimensions of behavioral intention,health literacy,risk perception,health anxiety,and convenience of medical access,with a total 21 entries.The scale is scored on a 7-point Likert scale,with scores ranging form 1 to 7 on a scale from “strongly disagree” to “strongly agree”,and total scores ranging from 21 to 147.The higher the score,the better online health information-seeking behavior.The Cronbach's alpha coefficient for this scale in this study was 0.817.

1.2.3 eHealth Literacy Scale(eHEALS)

This Scale was complied by Norman et al.[19]in 2006 and later adapted into Chinese by Chinese scholar Guo Shuaijun et al.[20].The scale covers 3 dimensions of application ability,judgment ability,and decision-making ability,with a total of 8 entries.The scale is scored on a 5-point Likert scale,with scores ranging form 1 to 5 on a scale from “very incompatible” to “very compatible”,and total scores ranging from 8 to 40.The higher total score indicates better eHealth literacy in patients. The scoring criteria are as follows: a score of <26 points indicates a low level of eHealth literacy, while a score of ≥26 points indicates a high level. The Cronbach's alpha coefficient for this scale in this study was 0.913.

1.2.4 Patient Activation Measure(PAM)

This Scale was complied by Hibbard et al.[21]in 2004 and adapted into Chinese by Taiwanese scholar Xu Yuwen[22].The scale covers 1 dimension and includes 13 entries.The scale is scored on a 5-point Likert scale,with scores ranging form 1 to 5 on a scale from “strongly disagree” to “strongly agree”,with “not applicable”scored as 0 points. The raw total score is logarithmically transformed and standardized to a range of 0 to 100 points,with the higher total score indicates higher levels of patient activation.Based on the standardized scores, patient activation can be classified into four levels: Level 1 (≤47.0 points), Level 2 (47.1–55.1 points), Level 3 (55.2–67.0 points), and Level 4 (≥67.1 points). The Cronbach's alpha coefficient for this scale in this study was 0.882.

1.2.5 Perceived Social Support Scale(PSSS)

This Scale was complied by Zimet et al.[23]and adapted into Chinese by Chinese scholar Jiang Qianjin et al[24].The scale covers 3 dimensions of family support,friend support,and other support, totaling 12 entries.The scale is scored on a 7-point Likert scale,with scores ranging form 1 to 7 on a scale from “strongly disagree” to “strongly agree”,and total scores ranging from 12 to 84.The higher scores indicates higher levels of perceived social support. Based on the total score, the level of social support can be classified as: low support level (12–36 points), moderate support level (37–60 points), and high support level (61–84 points). The Cronbach's alpha coefficient for this scale in this study was 0.922.

1.2.6 General Self-Efficacy Scale(GSES)

This Scale was complied by Ralf Schwarzer et al[25]and adapted into Chinese by Chinese scholar Wang Caikang et al[26].The scale covers 1 dimension and includes 10 entries.The scale is scored on a 4-point Likert scale,with scores ranging form 1 to 4 on a scale from “not at all true” to “exactly true”,and total scores ranging from 10 to 40.The higher scores indicates stronger self-efficacy. Based on the total score, the level of self-efficacy can be

classified as follows: 10–19 points indicates a relatively low level (poor self-confidence); 20–29 points indicates a moderate level (fair self-confidence); and 30–40 points indicates a high level (good self-confidence). The Cronbach's alpha coefficient for this scale in this study was 0.890.

1.3 Ethical review and data collection

This study was approved by the Ethics Committee of the Second Affiliated Hospital of Dalian Medical University (KY2025-019-01) and was conducted in accordance with the principles of the Declaration of Helsinki (1964) and its subsequent revisions. Prior to data collection, two trained researchers informed all participants of the purpose and procedures of the study and obtained written informed consent.Participants were assured that their participation was voluntary and that their privacy, autonomy, and right to withdraw would be fully respected. All personal information was kept confidential to ensure data security. Patients with mild symptoms and adequate self-care ability completed the questionnaires independently. For participants who experienced difficulties in completing the questionnaires, trained researchers administered the survey through face-to-face questioning, or they completed it together with their family members. Questionnaire distribution and collection were conducted on-site, and invalid questionnaires were excluded after verification.

1.4 Statistical Methods

Statistical analysis was performed using SPSS version 25.0. Categorical data were described as frequencies and percentages (%). Normally distributed continuous data were expressed as mean ± standard deviation. Univariate analysis was performed using the chi-square test and one-way analysis of variance (ANOVA). With the latent profile-derived subgroups of online health information-seeking behavior as the dependent variable, multinomial logistic regression analysis was performed.The significance was defined as $P<0.05$.

Latent profile models of IHISB in elderly stroke patients were constructed using Mplus 8.3. Starting from one class, the number of classes was gradually increased, model parameters were analyzed, and the optimal model was selected based on fit indices. The fit indices that were selected included Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and adjusted Bayesian Information Criterion (aBIC), smaller values of these indices were considered to indicate better model fit;The entropy value of ≥0.8 was taken to indicate high classification accuracy, and the closer entropy was to 1, the higher the classification accuracy of the model was considered to be; Lo–Mendell–Rubin Likelihood Ratio Test (LMRT) and Bootstrap's Likelihood Ratio Test (BLRT) were used to compare differences in model fit, $P<0.05$ was considered to indicate that the k-class model fit the data significantly better than the k-1 class model.

Results

2.1 General Information about elderly stroke patients

The 327 elderly stroke patients were 204 males (62.4%);The age was (69.77 ± 5.61) years old;228 cases (69.7%) lived in towns or cities, and 99 (30.3%) lived in rural areas;79 cases (24.2%) were single, and 248 (75.8%) were married.;monthly household income <3000 RMB in 68 cases (20.8%), 3000–5000 RMB in 200 cases (61.2%), >5000 RMBin 59 cases (18.0%);205 cases (62.7%) were first-onset stroke,122 cases (37.3%) were recurrent stroke;the number of comorbidities of chronic disease in one case in 138 patients (42.2%) ,≥two cases in 69 cases (21.1%).

The specific information can be found in Table 1.

2.2 Potential profiling of Online Health Information-Seeking Behavior in elderly stroke patients

Using the five dimensions of IHISB for elderly stroke patients as manifest variables, latent profile models with one to five classes were sequentially fitted,and the results of model fitting are shown in Table 2.The findings indicated that with the progressive increase in the number of fitted classes, AIC, BIC, and aBIC all showed a decreasing trend. However, in the four-class model, one class had a probability of less than 10%. For the three-class model, both the LMRT and BLRT values reached statistical significance, and the Entropy value was 0.862, above the critical criterion of 0.8. Thus, Model 3 demonstrated satisfactory performance across all fit evaluation indices.Based on a combination of the fit indices and the clinical interpretability of each class, the model 3 was selected as the optimal model in this study.

Table2 Information on the fitting of the internet health information-seeking behavior profile model in elderly stroke patients（n=327）

Model	AIC	BIC	aBIC	LMR	BLRT	Entropy	Categorization model
1	4721.770	4759.670	4727.950	-	-	-	-
2	4050.349	4110.989	4060.238	<0.001	<0.001	0.92	0.777/0.223
3	3848.516	3931.896	3862.113	<0.001	<0.001	0.862	0.480/0.352/0.168
4	3774.765	3880.884	3792.070	0.0199	0.0217	0.876	0.471/0.113/0.352/0.064
5	3742.514	3871.373	3763.526	0.0667	0.0714	0.802	0.294/0.306/0.110/0.235/0.055

To verify the reliability of the findings, we calculated the average attribution probability for each class. The results indicated that the classification probabilities for classes 1, 2, and 3 were 94.3%, 90.6%, and 96.9%, respectively, all exceeding the 90% threshold. These findings confirm that the optimal model derived from the latent profile analysis in this study is dependable and exhibits strong discriminative power. See Table 3.

Table3 Average attribution probabilities for each potential category（%）

Class	C1	C2	C3
C1	0.943	0.057	0.000
C2	0.087	0.906	0.007
C3	0.000	0.031	0.969

2.3 Naming of potential profile analysis results

Based on Model 3, the mean scores of each class across the five dimensions of IHISB are presented in Fig. 1. The first class comprised 157 patients (48%), whose scores on all dimensions were lower than those of the other two classes. Notably, their scores on the behavioral intention and health literacy dimensions were particularly low, suggesting that this group may lack intrinsic motivation for online health information seeking and show little interest in health information; therefore, it was named the “Information apathy type”; The second class consisted of 115 patients (35.2%), whose scores on all dimensions were at a moderate level, with slightly higher scores on the risk perception and behavioral intention dimensions. This indicates that this group may have a certain level of health risk awareness; accordingly, it was named the “Moderate attention type”; The third class included 55 patients

(16.8%), whose scores on all dimensions were higher than those of the other two groups, with particularly high scores on the health literacy and convenience of medical access dimensions. This suggests that this group has a strong willingness and ability to actively seek health information and is adept at utilizing healthcare resources; thus, it was named the “ Proactive inquisitive type ”.

2.4 One-way analysis of potential categories of online health information-seeking behavior

The results of the univariate analysis demonstrated that significant differences existed among the latent profile groups of online health information-seeking behavior with respect to gender, age, educational level, occupation, place of residence, monthly household income, marital status, caregiver, eHEALS scores,PAM scores,PSSS scores,GSESscores ($P < 0.05$). Detailed results are presented in Table 4.

2.5 Multifactorial analysis of potential categories of online health information-seeking behavior

The three latent profiles of online health information-seeking behavior were used as the dependent variable, with the information apathy type serving as the reference category. Variables that showed statistical significance in the univariate analysis were entered as independent variables into a multinomial logistic regression model. The results indicated that age, educational level, monthly household income, eHealth literacy, patient activation, perceived social support, and self-efficacy were independent influencing factors associated with different latent profiles of online health information-seeking behavior among older stroke patients ($P < 0.05$). Detailed results are shown in Table 5.

Discussion

3.1 Online health information-seeking behavior in elderly stroke patients is at a low level and exhibits population heterogeneity

The research results showed that the total score of the Internet Health Information Seeking Behavior Scale in elderly stroke patients was(65.62 ± 18.48), indicating a relatively low level. This results is similar to the results of study on previous research[27]. Possible explanations include that elderly patients tend to prefer traditional health information acquisition methods, such as consulting doctors offline, and have relatively weak skills in using Internet platforms[28], resulting in a low degree of reliance on online information seeking [29]. The results of Potential profile analysis indicated that online health information-seeking behavior in elderly stroke patients could be classified into three types, demonstrating significant population heterogeneity. Among these, the information apathy type, which accounted for the largest proportion, scored low on all dimensions of behavioral intention, health literacy, risk perception, health anxiety, and convenience of medical access. This suggests that these elderly stroke patients may lack motivation and skills for information seeking and have disease-related cognitive biases. They are mainly characterized by advanced age, low education level, and poor economic status, making them prone to exhibiting negative online health information-seeking behaviors. The proactive inquisitive tupe, by contrast, scored high on all dimensions, and these patients generally possess high levels of awareness, learning ability, and social support. They are able to translate positive beliefs into stable and active health information-seeking behaviors, thereby obtaining health-related information and promoting their own health [30]. The moderately attentive type scored at a moderate level across all dimensions. A possible reason is that although these patients have some interest in and need for online health information, they fail to fully utilize online resources due to a lack of corresponding skills or confidence [31].

3.2 Older age and low monthly household income are associated with low levels of online health information-seeking behavior.

The research results showed that patients aged ≥70 years and those with low monthly household income were more likely to belong to the information apathy type. As age increases, physical function further declines, and patients may face challenges such as multimorbidity. Their health information needs tend to focus more on symptom management, and they prefer obtaining health information through medical staff [32]rather than actively exploring it on their own. They also encounter more difficulties in accessing emerging information channels [33]. Patients with low income, due to financial pressure, are more inclined to choose free or low-cost traditional channels when selecting methods of information acquisition, which to some extent limits the development of online health information-seeking behavior in this population [34]. Therefore, healthcare professionals need to pay close attention to older and low-income patients. For the older age group, efforts should focus on building an intergenerational digital support system, including daily assistance from family members and professional guidance from community staff, as well as implementing interventions that combine online and offline approaches to overcome barriers to technology use [35]. For elderly patients with low income, free health lectures and counseling services should be provided through communities and hospitals [36]. Additionally, low-cost online health information consultation platforms can be developed to reduce the cost of information access and enhance their motivation for online health information seeking.

3.3 Higher education level is associated with higher levels of online health information-seeking behavior

The research results showed that patients with higher education levels were more likely to belong to the proactive inquisitive type, which is consistent with the findings of Crouch E [37]. A higher level of education is usually accompanied by better eHealth literacy and stronger abilities in using computers and understanding information, which facilitates the mastery of information retrieval skills, enabling patients to identify effective information, evaluate its quality, and utilize it. In contrast, elderly patients with lower education levels face difficulties such as literacy barriers and cannot meet the high demands of searching for health information online. The vast majority of these elderly patients obtain health information through consulting doctors, receiving information from family members, or watching television news broadcasts[38]. Therefore, when dealing with elderly patients of different educational levels, healthcare professionals should adopt different health information guidance strategies. For elderly patients with higher education levels, healthcare professionals should act as facilitators while the patients take the lead in searching for knowledge about diseases, health, and wellness through online platforms, thereby strengthening their online information-seeking behavior. For elderly patients with lower education levels, healthcare professionals should take the lead in actively helping them understand relevant information and implementing health education [39].

3.4 Higher levels of eHealth literacy, patient activation, self-efficacy, and perceived social support are associated with higher levels of online health information-seeking behavior

The research results showed that patients with higher levels of eHealth literacy, patient activation, perceived social support, and self-efficacy were more likely to belong to the proactive inquisitive type. The reasons may be as follows. Elderly stroke patients often face a "digital divide" when accessing electronic health information due to physical dysfunction, cognitive decline, and unfamiliarity with technological devices, which can easily lead tofear of difficulties and information anxiety [40]. Higher eHealth literacy enables elderly patients to use online tools more confidently, effectively screen and evaluate health information, and make sound health decisions [41]. Meanwhile, patients with higher activation levels possess the knowledge and self-confidence necessary for participating in

health management [42]; they are proactive, willing to cooperate with medical staff in treatment, and exhibit active health information-seeking behaviors, playing an important role in self-disease management [43]. Patients with higher self-efficacy can objectively understand their own health status, rationally accept negative emotions arising from the disease process, and adopt positive coping behaviors, thereby efficiently using online platforms to search for high-quality health information [44] and making decisions beneficial to their health. This confidence enables them to use online resources more frequently and maintain clear judgment when faced with vast amounts of health information, avoiding unnecessary anxiety [45]. In addition, good social support can effectively alleviate patients' psychological burden and enhance their intrinsic motivation to obtain health information [46]. Patients with high levels of perceived social support feel cared for and supported from multiple perspectives and in various aspects [47], which can effectively reduce their fear of using the internet and encourage them to break through traditional information acquisition methods and try new approaches such as online channels [48]. Therefore, nursing staff should adopt comprehensive intervention strategies. By offering targeted eHealth literacy training courses, they can help elderly stroke patients overcome technophobia, establish a correct understanding of online media, and improve their online health information-seeking behavior [49]. At the same time, it is recommended that healthcare professionals consider patient activation as a key component of nursing assessment and intervention to promote the formation and consolidation of active health information-seeking behaviors. Furthermore, medical staff should focus on improving the self-efficacy of elderly stroke patients, guiding them to build confidence in online health information platforms and making full use of the positive role of online health information among the elderly population. Finally, by strengthening family health education, healthcare professionals can instruct family members to create a supportive environment, encourage elderly stroke patients to participate in group exchanges, share their experiences and insights regarding online health information seeking, and thereby enhance their confidence and motivation to reuse online resources for health management.

Limitations

Several limitations of this study should be acknowledged. First, the representativeness of the sample was limited, as all participants were recruited from Liaoning Province, China, which may restrict the generalizability of the findings. Future studies are recommended to recruit larger samples from multiple regions and incorporate additional influencing factors to further validate and expand the current findings.Second, this study adopted a cross-sectional design and therefore could not capture temporal changes in online health information-seeking behavior among older stroke patients. Future longitudinal studies are warranted to track the developmental trajectories of online health information-seeking behavior across different latent profiles over time, thereby revealing dynamic changes and the long-term effects of influencing factors. Such evidence would provide a stronger basis for developing precise and effective health management interventions.In addition, this study focused exclusively on patients’ self-initiated online health information-seeking behavior and did not distinguish between different information acquisition channels. Moreover, patients who relied entirely on non-digital channels for obtaining health information were not included. Future research could integrate assessments of information channel preferences and information quality evaluation tools to provide a more comprehensive understanding of health information acquisition among older stroke patients.

Conclusion

In this study,there is significant heterogeneity in online health information-seeking behavior among elderly stroke patients.We categorized the online health information-seeking behavior of elderly stroke patients into “Information apathy type”,“Moderate attention type ”,and “The proactive inquisitive type”through latent profile analysis.Each category had significant differences in gender, age, education level, occupation, place of residence, monthly household income, marital status, caregiver, eHealth literacy, patient activation, perceived social support, and self-efficacy.Healthcare professionals should implement precise, stratified interventions based on the subtypes of patients' online health-seeking behavior, with a focus on improving patients' eHealth literacy, enhancing patient activation, strengthening self-efficacy, and building social support networks to increase perceived social support, thereby comprehensively improving their level of online health information-seeking behavior.

Declarations

Data availability

The dataset supporting the findings of this study is available from the corresponding author upon reasonable request.

Acknowledgements

The authors would like to thank the patients and their families and the medical staff for their help.

Funding

This study was funded by “University Students' Innovation and

Entrepreneurship Guidance Teacher Training Program”(NO.2024CXCYPY05)

and Joint Fund Project of “Pooling Wisdom and Integrating

Intelligence-Medicine-Engineering Interdisciplinary Collaboration” between

Dalian Neusoft University of Information and The Second Affiliated Hospital

of Dalian Medical University(NO.LH-JSRZ-202207)These funds were used to

support the study design,data collection, analysis,and manuscript preparation.

Contributions

Yq P:Conceptualization,Data curation,Methodology,Investigation,Project administration.Jl W:Writing-original draft,Writing-review &editing,Conceptualization.Yq P andJL W are co-first authors.

N J:Methodology,Investigation.Sl C:Conceptualization,Writing-review&editing,Supervision,Project administration,Funding acquisition.

Ethics declarations

Ethics approval and consent to participate

This study was conducted with the authorization of the Ethics Committee of Second Affiliated Hospital of Dalian Medical University (KY2025-019-01) and adhered to the principles of the 1964 Helsinki Declaration and its subsequent revisions.Before the study,written informed consent was obtained from all participants.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Clinical trial number

Not applicable.

References

1. GBD 2019 Stroke Collaborators. Global, regional, and national burden of stroke and its risk factors, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. *Lancet Neurol.* **20** (10), 795–820 (2021).
2. Brief report on stroke prevention and treatment in. china,2021[J]. *Chin. J. Cerebrovasc. Dis.* **20** (11), 783–793 (2023). (In Chinese).
3. Report on Cardiovascular Health and Diseases in. China 2024:an Updated Summary[J]. *Chin. Circulation J. 2025*, **40**(06):521–559 .(In Chinese).
4. Hatem, S. M. et al. Rehabilitation of Motor Function after Stroke: A Multiple Systematic Review Focused on Techniques to Stimulate Upper Extremity Recovery. *Front. Hum. Neurosci.* **10**, 442 (2016).
5. Dawson, J. et al. Vagus nerve stimulation paired with rehabilitation for upper limb motor function after ischaemic stroke (VNS-REHAB): a randomised, blinded, pivotal, device trial. *Lancet* **397** (10284), 1545–1553 (2021).
6. Wan, M. et al. Cognitive behavioural therapy for depression, quality of life, and cognitive function in the post-stroke period: systematic review and meta-analysis. *Psychogeriatrics* **24** (4), 983–992 (2024).
7. Mitchell, C. et al. COS-Speech: protocol to develop a core outcome set for dysarthria after stroke for use in clinical practice and research. *Trials* **24** (1), 57. 10.1186/s13063-022-06958-7 (2023).
8. Wong, D. K. & Cheung, M. K. Online Health Information Seeking and eHealth Literacy Among Patients Attending a Primary Care Clinic in Hong Kong: A Cross-Sectional Survey. *J. Med. Internet Res.* **21** (3), e10831 (2019).
9. Chen Shengguang, Q. et al. Research progress on online health information seeking behavior in elderly patients with chronic diseases[J]. *Chin. Nurs. Res.* **38** (8), 1365–1370 (2024). (In Chinese).
10. Waterworth, S. & Honey, M. On-line health seeking activity of older adults: an integrative review of the literature. *Geriatr. Nurs.* **39** (3), 310–317 (2018 May-Jun).
11. Liu, Z., Whitener, G. & Hwang, C. L. *Association of online health information seeking behavior with levels of knowledge about palliative care among older adults[J]* Vol. 49, 8–12 (Geriatric Nursing, 2023).
12. Sjöström, A. et al. Experiences of Online COVID-19 Information Acquisition among Persons with Type 2 Diabetes and Varying eHealth Literacy[J]. *Int. J. Environ. Res. Public Health*. **18** (24), 13240 (2021).

13. Hayriye, G. & Nikol, K. Adolescents' disease- and fitness-related online health information seeking behaviors: The roles of perceived trust in online health information, eHealth literacy, and parental factors[J]. *Comput. Hum. Behav.*, 134. (2022).
14. Liu, J. *A study on the current status of eHealth literacy and online health information seeking behavior among patients with chronic diseases[D]* (Wuhan Polytechnic University, 2023).
15. Diagnostic criteria of cerebrovascular diseases in. China(version 2019)[J]. *Chin. Soc. Neurol.* **52** (9), 710–715 (2019). (In Chinese).
16. Ning, P. Chen JL,Liu N.The sample size estimation in quantitative nursing research[J]. *Chin. J. Nurs. 2010*, **45**(4):378–380 .(In Chinese).
17. Wang, Z. Y. Study on Internet Health Information Seeking Behavior of Middle-aged Urban Residents and its Influencing Factors[D]. Zhejiang University, 2019.(In Chinese).
18. Zhu, Y. R. Study on the status and influencing factors of OnlineHealth Information Seeking Behavior in Older Patients with Coronary Heart Disease[D]. Qingdao University, 2024.(In Chinese).
19. Norman, C. D. & Skinner, H. A. eHealth Literacy: Essential Skills for Consumer Health in a Networked World[J]. *J. Med. Internet. Res.* **8** (2), e9 (2006).
20. Guo, S. J. et al. Adaptation and evaluation of Chinese version of eHEALS and its usage among senior high school students[J]. *Chin. J. Health Educ.* **29** (2), 106–108 (2013). 123.(In Chinese).
21. Hibbard, J. H. et al. Development of the Patient Activation Measure (PAM): conceptualizing and measuring activation in patients and consumers[J]. *Health Serv. Res.* **39** (4 Pt 1), 1005–1026 (2004).
22. Xu, Y. W. *Development of patient activation measure and its relationship with patient behavior: A case study of diabetic patients[D]* (Institute of Health Care Organization Management, College of Public Health, National Taiwan University, 2005). (In Chinese).
23. Zimet, G. D. et al. The Multidimensional Scale of Perceived Social Support (MSPSS): Reliability and Validity of Russian Version[J]. *Clin. Gerontologist*. **43** (3), 331–339 (2020).
24. Publication of. Theory, Methods, and Clinical Practice[J]. *Chin. Mental Health J.* **26** (8), 576 (2012). (In Chinese).
25. Bandura, A. Self-efficacy: toward a unifying theory of behavioral change[J]. *Psychol. Rev.* **84** (2), 191–215 (1977).
26. Wang Caikang, H. & Zhongfeng Liu Yong.Evidences for Reliability and Validity of the Chinese Version of General Self-Efficacy Scale[J]. *Chin. J. Appl. Psychol.*, (1): 37–40. (2001). (In Chinese).
27. Wang, X. L. et al. A review of competency of online health information acquisition and influencing factors in the older population[J]. *J. Nurs. Sci.* **39** (11), 20–23 (2024). (In Chinese).
28. Aria, R. & Archer, N. The role of support and sustainability elements in the adoption of an online self-management support system for chronic illnesses. *J. Biomed. Inf.* **95**, 103215 (2019).
29. Barr, P. J. et al. Public know-ledge and perceptions of connected health[J]. *J. Eval Clin. Pract. 2014*, **20**(3):246–254 .
30. Kim, K., Shin, S., Kim, S. & Lee, E. The Relation Between eHealth Literacy and Health-Related Behaviors: Systematic Review and Meta-analysis. *J. Med. Internet Res.* **25**, e40778 (2023).
31. Manafò, E. & Wong, S. *Promoting eHealth literacy in older adults: key informant perspectives[J]. Canadian Journal of Dietetic Practice and Research: A Publication of Dietitians of Canada = Revue Canadienne De La Pratique Et De La Recherche En Dietetique* Vol. 74, 37–41 (Une Publication Des Dietetistes Du Canada, 2013). 1.

32. Chaudhuri, S. et al. Examining health information-seeking behaviors of older adults[J]. *Computers Inf. nursing: CIN*. **31** (11), 547–553 (2013).
33. Crouch, E. & Gordon, N. P. Prevalence and Factors Influencing Use of Internet and Electronic Health Resources by Middle-Aged and Older Adults in a US Health Plan Population: Cross-Sectional Survey Study. *JMIR Aging*. **2** (1), e11451 (2019).
34. Yi, J. H. A review of foreign research on online health information seeking behavior of the elderly[J]. *J. Zhoukou Normal Univ.* **32** (6), 151–154. 10.13450/j.cnki.jzknu.2015.06.038 (2015). .(In Chinese).
35. Ma, X. et al. Understanding online health information seeking behavior of older adults:a social cognitive perspective[J]. *Front. Public. Health*. **11**, 1147789 (2023).
36. Xie, B. & Bugg, J. M. Public library computer training for older adults to access high-quality Internet health information. *Library&information Sci. Res.* **31** (3), 155–162 (2009).
37. Crouch, E., Gordon, N. P. & Aging Prevalence and factors influencing use of internet and electronic health resources by middle-aged and older adults in a US health plan population:cross-sectional survey study[J].JMIR 2(1):e11451. (2019).
38. Czaja, S. J. et al. Factors influencing use of an e-health website in a community sample of older adults[J]. *J. Am. Med. Inf. Assoc.* **20** (2), 277–284 (2013).
39. Wang, X., Shi, J. & Kong, H. Online Health Information Seeking: A Review and Meta-Analysis[J]. *Health Commun.* **36** (10), 1163–1175 (2021).
40. Luo, D. et al. Influence of social support on technophobia in older adults in urban communities: the mediating role of self-efficacy and e-health literacy, a cross-sectional study. *BMJ Open.* **15** (2), e093107 (2025).
41. Yang, Y. et al. Improving the eHealth literacy of older adults: A scoping review. *Geriatr. Nurs.* **60**, 128–136 (2024 Nov-Dec).
42. Wilkinson, T. J. et al. Determinants of patient activation and its association with cardiovascular disease risk in chronic kidney disease: A cross-sectional study[J]. *Health Expectations: Int. J. Public. Participation Health Care Health Policy*. **24** (3), 843–852 (2021).
43. Newland, P., Lorenz, R. & Oliver, B. J. Patient activation in adults with chronic conditions: A systematic review[J]. *J. Health Psychol.* **26** (1), 103–114 (2021).
44. Sedrak, M. S. et al. Online Health Information-Seeking Among Older Women With Chronic Illness: Analysis of the Women's Health Initiative[J]. *J. Med. Internet. Res.* **22** (4), e15906 (2020).
45. Basnyat, I. et al. Applying the Modified Comprehensive Model of Information Seeking to Online Health Information Seeking in the Context of India[J]. *J. Health Communication*. **23** (6), 563–572 (2018).
46. Matthias, M. S. et al. Exploring the Relationships Among Social Support, Patient Activation, and Pain-Related Outcomes[J]. (2022). Pain Medicine (Malden, Mass.), **23**(4): 676–685 .
47. Dural, G., Kavak Budak, F., Özdemir, A. A. & Gültekin, A. Effect of Perceived Social Support on Self-care Agency and Loneliness Among Elderly Muslim People. *J. Relig. Health*. **61** (2), 1505–1513 (2022).
48. Shiu, L. S., Huang, Y. S., Liu, C. Y., Cheng, Y. S. & Chen, Y. C. eHealth Literacy Mediating Social Support and Technology Acceptance Among Patients With Chronic Illnesses: A Cross-Sectional Study. *J. Adv. Nurs.* **82** (5), 5049–5059 (2026).
49. Liu, S. Q. et al. Research on status quo and countermeasures of elderly digital health literacy under the background of active aging[J]. *Chin. Nurs. Res.* **35** (2), 250–254 (2021). (In Chinese).

Figures

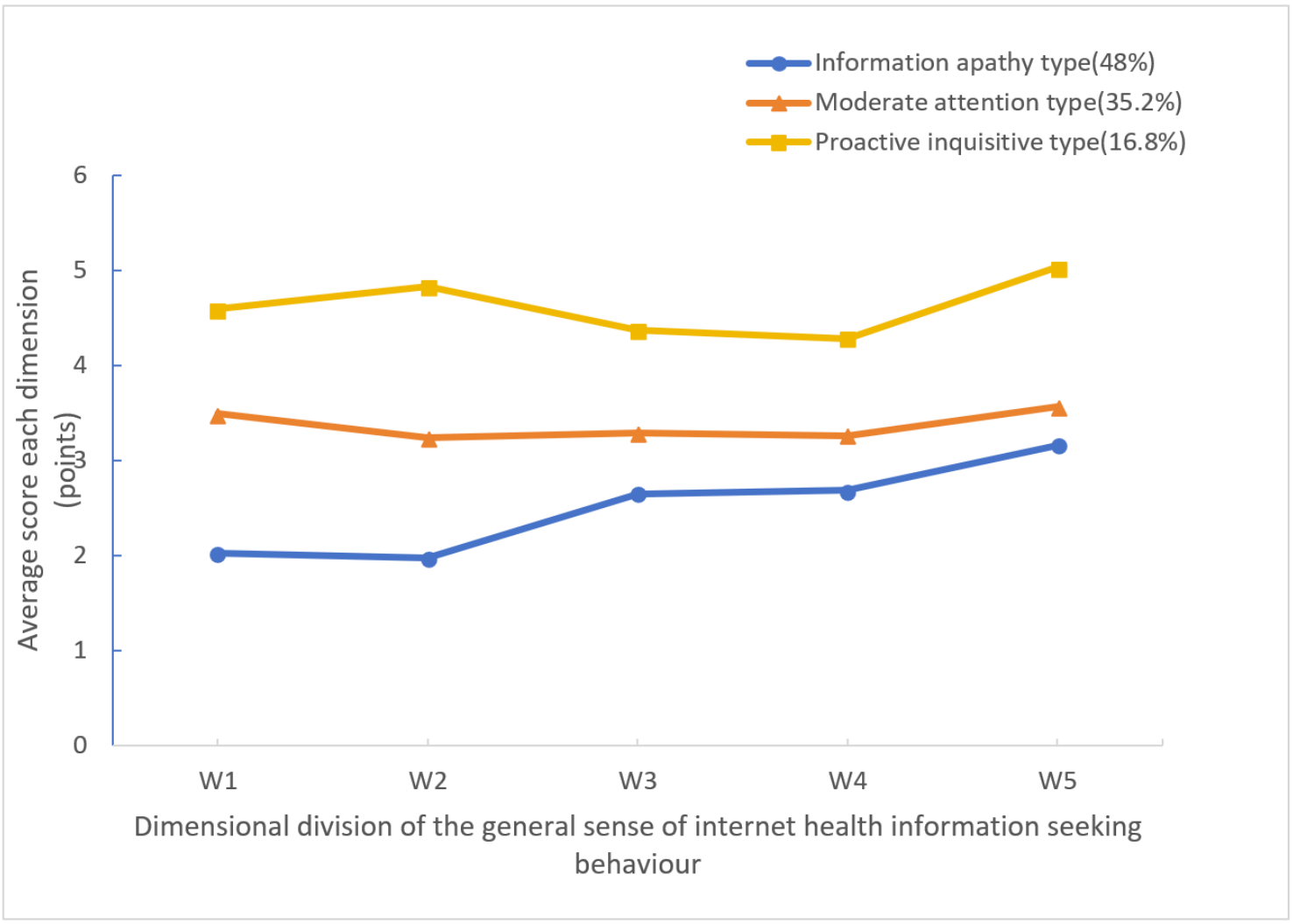


Figure 1

Distribution of characteristics of the three potential categories of Internet health informationseeking behavior .Note:w1:behavioral intention;W2:health literacy;W3:risk perception;W4: health anxiety;W5:convenience of medical access

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- SupplementaryMaterial1.docx