

The Impact of Hypertension Literacy on Older Adults’ Health Information Behavior: A Systematic Review

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Abstract

Background

Hypertension literacy significantly influences older adults' health information behaviors. However, current research lacks systematic verification of the complete literacy-behavior-outcome pathway, limiting identification of key mediating variables. This study systematically assesses mechanisms by which hypertension literacy affects elderly populations' health information behavior.

Method

We conducted a systematic literature review, retrieving literature from the three major databases—Web of Science, Scopus, and PubMed—between January 2015 and March 26, 2025. Based on the PICO framework, four core search concepts were established: “hypertension,” “health literacy,” “elderly,” and “health information behavior.” Inclusion criteria included: studies targeting the elderly, incorporating measurements related to hypertension literacy, exploring the relationship between hypertension literacy and health information behavior, and original research published in English. Ultimately, 14 studies were included for quality assessment and data extraction analysis.

Results

Results revealed significant associations between hypertension literacy and information behavior. Older adults with high hypertension literacy actively sought information through multiple channels and demonstrated enhanced critical appraisal abilities; low-literacy individuals rely on single authoritative sources with limited access. Hypertension literacy influences behavior through knowledge, psychological, and technological pathways. Social support, disease progression, and technology adaptation serve as key moderating factors.

Conclusion

This review revealed multiple mechanisms linking hypertension literacy to elderly information behavior. Future research should develop integrated intervention programs addressing knowledge, psychology, and technology dimensions while optimizing information ecosystem accessibility and credibility.

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1. Introduction

Hypertension is recognized as one of the most prevalent chronic non-communicable diseases globally, affecting over 1.28 billion adults worldwide and representing a leading contributor to the global disease burden (WHO, 2023; Charchar et al., 2024). Recent epidemiological studies indicate that hypertension prevalence reaches 70% among adults aged ≥ 65 years, with projections suggesting continued increases due to demographic transitions (Brunström et al., 2023). Hypertension represents the foremost independent risk factor for stroke, myocardial infarction, and cardiovascular death in older adults, with this risk becoming increasingly significant as populations age (Saini & Gurvendra, 2022; Bogicevic et al., 2024). Hypertension poses significant threats to the well-being of the elderly in their later years (Zeng et al., 2023). Self-management of hypertension is a key component in achieving blood pressure control and complication prevention, and hypertension literacy is a core competency for hypertensive patients to participate in hypertension management (Du et al., 2018; Ghaffari-Fam et al., 2020; Lor et al., 2019).

Hypertension literacy refers to an individual's integrated ability to search for, understand, internalize and utilize diverse hypertension-related information to enable the individual to develop a positive health outcome (Saini & Gurvendra, 2022; Konlan et al., 2023). Building upon Nutbeam's (2000, 2008) foundational health literacy model and Sørensen et al.'s (2012) comprehensive framework, hypertension literacy encompasses multiple dimensions of health information processing (Liu et al., 2020). Individuals with

adequate hypertension literacy exhibit core competencies critical for hypertension management. These include functional literacy, such as interpreting and understanding hypertension-specific educational materials; interactive literacy, exemplified by effective communication with healthcare providers regarding blood pressure management; and critical literacy, demonstrated through informed hypertension-related decision-making (Bogicevic et al., 2024; Zeng et al., 2023; Mourouti et al., 2022). Limited hypertension literacy affects 23-59% of hypertensive patients globally and has been identified as a modifiable risk factor for suboptimal blood pressure control, strongly associated with negative clinical outcomes (Konlan et al., 2023; Nutbeam, 2008; Babazadeh et al., 2024; Zhang et al., 2023; Ranjbaran et al., 2022; Ocakoglu et al., 2020). Self-management education tailored to health literacy levels has demonstrated significant improvements in medication adherence and blood pressure control (Delavar et al., 2020; Zhang et al., 2023).

Health information behavior encompasses the totality of human behaviors related to health information sources and channels, establishing relationships between health information needs and health decision-making (Wilson, 1999; Zhu et al., 2022; Lu et al., 2021). This conceptualization has evolved significantly with digital health transformation, particularly affecting older adults' information-seeking patterns (Zhao et al., 2022; Ma et al., 2023). Health information behaviors serve as the bridge between hypertension literacy and hypertension health outcomes, with information behaviors more likely to be constrained by literacy levels in older adults

due to cognitive decline and technology adaptation barriers (Cotter & Yang, 2024; Ghaffari-Fam et al., 2020; Saenyabutr et al., 2024). Recent systematic reviews indicate that 64% of older adults with limited health literacy demonstrate passive information-seeking patterns, compared to 23% among those with adequate literacy (Marshall et al., 2025; Chang et al., 2021). Social support and physical literacy interact significantly with health information behaviors, mediated by sense of coherence and self-efficacy (Liu et al., 2024; Marshall et al., 2025).

The emergence of electronic health literacy (eHealth literacy) has introduced additional complexity to this relationship, encompassing traditional health literacy competencies while incorporating digital skills necessary for navigating online health information environments (Norman & Skinner, 2006; Jung et al., 2022). Bibliometric analyses reveal digital health literacy as a rapidly expanding field, with increasing attention to older adult populations and chronic disease management (Yang et al., 2022; Shi et al., 2023). Studies reveal significant disparities in digital health literacy among older adults, with only 12-34% demonstrating adequate eHealth literacy skills (Shi et al., 2024; Kim et al., 2025; Jiang et al., 2024). Systematic reviews indicate that multiple factors influence digital health literacy levels, including cognitive abilities, technology experience, and social support systems (Shi et al., 2024; Yuen et al., 2024). These digital divides compound existing health literacy challenges, creating multilayered barriers to effective health information behaviors. Recent studies have developed and validated comprehensive measurement tools to assess digital health literacy in older populations (Kim et al., 2025; Jiang et al., 2024).

Although there is evidence that health literacy has a positive impact on the health

information behaviour of people with hypertension, there is a significant gap between theory and practice (Ghaffari-Fam et al., 2020; Pongkiatchai et al., 2022; Xu et al., 2024; Yuan et al., 2024). Some studies showed that hypertension education improves hypertension literacy but does not improve behaviour (Saenyabutr et al., 2024; Dwinger et al. 2020; Song et al., 2021; Hassan et al., 2023). Medication adherence patterns in elderly hypertensive patients are influenced by multiple factors including health literacy, illness perception, and environmental predictors (Babazadeh et al., 2024; Han et al., 2020; Thuy et al., 2020; Uchmanowicz et al., 2019). The degree to which the health information behaviour of elderly hypertensive patients changes is still not ideal, and they do not make effective use of health information. The majority of existing studies examined either health literacy or information behavior separately, without systematically validating the sequential relationship from health literacy through information behavior to health outcomes (Tricco et al., 2018; Page et al., 2021). This fragmented research paradigm makes it difficult to identify key intermediate variables such as information decoding and decision evaluation. Notably, while abundant evidence exists for general and younger populations, elderly-focused studies remain conspicuously underdeveloped in the current literature (Teo et al., 2022; Li et al., 2021).

This study aims to systematically evaluate the impact of hypertension literacy on the health information behaviour of the elderly population, following PRISMA 2020 guidelines (Page et al., 2021; Rethlefsen et al., 2021), focusing on two core dimensions: first, exploring how hypertension literacy influences the ability to judge the credibility of information sources and the choice of search strategies, shaping the way elderly patients access health information related to

hypertension, and revealing their behaviour heterogeneity in different information ecosystems; second, analysing the dynamic regulatory effect of hypertension literacy on key behaviours such as information assessment and adoption.

2. Methods

2.1 Study Design

This systematic review was conducted based on the original protocol (CRD 420251005016) and followed PRISMA (Preferred Reporting Items for Systematic reviews and MetaAnalyses) guidelines (PRISMA Statement, 2025). And this review was designed to investigate two central research questions, that are (1) "What is the relationship between hypertension literacy and the health information-seeking behaviors of older adults?" and (2) "How does hypertension literacy affect the decision-making processes of older adults regarding hypertension management and treatment options?" This systematic review methodology aligns with contemporary best practices for health literacy research synthesis (Pollock et al., 2020; Jordan & Pilla, 2024) and follows established protocols for mixed-methods evidence integration (Munn et al., 2018).

2.2 Information Sources

This systematic literature review covered the period from January 2015 to 26 March 2025, and used the Web of Science, Scopus and PubMed as the three cross-disciplinary authoritative databases for the full-text search.

2.3 Eligibility Criteria

All included articles were peer-reviewed publications published between January 2015 and March 26, 2025. This timeline was chosen because it covers three key transition periods in health information behavioral research: the rise of digital literacy research for older adults driven by mHealth technologies; the reconfiguration of patient education systems driven by policies such as the WHO Global

Hypertension Report; and the Precision-based behavioral analysis paradigms spawned by technologies such as AI health assistants. The eligibility status of articles was determined through the systematic application of predefined inclusion and exclusion criteria (Table 1).

Table 1. Inclusion and exclusion criteria

Inclusion Criteria	Exclusion Criteria
Older adults aged 60 years and above	Not targeting older adults
Focusing on hypertension literacy	Not focusing on hypertension literacy
Measurable health information behaviors related to hypertension management	Not focusing on information behaviors
Empirical studies published in peer-reviewed journals	Non-empirical and secondary literature (opinion pieces, editorials, literature reviews, commentaries, meta-analyses, and conference abstracts)
Written in English	Non-English publications
With full text availability	Without full text availability

2.4 Search Strategy

We searched 3 electronic databases (Scopus, PubMed, and Web of Science) from 2015 until March 26, 2025. These databases were selected because they achieve a balance of three factors: breadth of subject coverage, depth of literature quality and methodological rigour. This provides a solid foundation for the academic credibility and innovation of systematic reviews. Using the PICO framework (Population, Intervention, Comparison, Outcome), we developed search strategies incorporating four key concepts:

hypertension, health literacy, older adults, and health information behavior. The search strategy development followed PRISMA-S guidelines for systematic review search reporting (Rethlefsen et al., 2021), ensuring comprehensive coverage of relevant databases and search terms. The comprehensive list of search terms are shown in Multimedia Appendix 1. Three researchers independently screened and identified studies. Divergent assessments underwent adjudication via a structured consensus-building protocol, incorporating third-party arbitration by senior investigators (AAA and EM) when required to establish inter-rater agreement in accordance with PRISMA conflict resolution guidelines.

2.5 Selection Process

All identified citations were imported and organized into the Rayyan (Ouzzani et al. 2016) reference management platform for selection. The screening and selection of studies were conducted by 3 researchers individually (RG, CG, and JL). CG removed duplicates. Initial screening of titles and abstracts was done independently by three researchers (RG, CG & JL) based on inclusion/exclusion criteria using a standardized screening tool, Rayyan, and through a blinded review mode to avoid mutual interference. Full-text access to the literature after the initial screening was performed, and two researchers (RG and JL) determined the final eligibility of the literature for inclusion based on a structured assessment form. The results of the screening were cross-referenced, and in case of inconsistent judgments, the RG and the JL tried to reach a consensus based on the strength of evidence and the criteria. If the dispute could not be resolved, the senior investigators (AAA and EM) independently reviewed the disputed literature and determined the final inclusion status based on majority vote.

In compliance with PRISMA guidelines, this study systematically searched the Web of

Science, PubMed, and Scopus databases, spanning the period from January 2015 to March 26, 2025, and initially identified 3215 relevant articles. After removing duplicates using Rayyan, 2,606 articles remained, and 2,168 non-target articles were excluded based on the titles and abstracts. Of the 438 articles that entered the full-text evaluation stage, they were further screened: (1) excluding 27 articles that did not focus on the elderly; (2) excluding 36 articles that did not focus on hypertension literacy; (3) excluding 19 articles that were not in English; (4) excluding three articles with inadequate research designs; and (5) excluding 339 articles that did not discuss the association between hypertension literacy and health information behavior. Ultimately, 14 articles that met all inclusion criteria were included. The complete screening process is shown in the PRISMA flowchart in Figure 1.

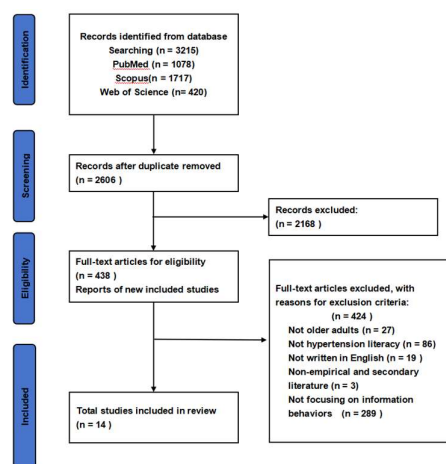


Figure 1. Flow diagram of study selection

2.6 Data Collection

The data collection process was executed through a collaborative effort between two researchers (RG and YW), wherein conflicting interpretations underwent formal mediation procedures overseen by an independent arbitrator (AAA) to ensure inter-rater reliability.

2.7 Quality Assessment

Mixed-Methods Appraisal Tool (MMAT) (Hong et al., 2018) was used to systematically assess the quality of the 14 included articles, aiming to ensure the scientific rigor of the study design and analysis methods. The first focus was on verifying the appropriateness of the research questions and data collection, the logical consistency of the qualitative data sources, and the integrative efficacy of the mixed-methods design (Table 2). The study design of the mechanisms linking hypertension literacy and information behavior was examined for clear matching of the study objectives. Then the assessment was carried out by a double-blind panel consisting of 2 researchers (RG and YW), and was double-checked based on differentiated criteria for qualitative studies (relevance, adequacy, logical coherence), quantitative studies (sampling rationality, sample representativeness, applicability of measurement tools, and statistical rigor), and mixed-methods studies (theoretical rationale, data complementarity, and ability to integrate heterogeneity), respectively. Each criteria was graded on a three-tier scale of “yes”, “no”, “don’t know/can’t tell”. A threshold was set for the literature to meet at least 3 criteria, and 8 articles that fulfilled all 5 criteria, 4 articles that fulfilled 4, and 2 articles that fulfilled 3 were finally screened (see Table 3), showing a gradient quality distribution. The MMAT framework has been validated for systematic reviews incorporating diverse methodological approaches (Souto et al., 2015), providing robust quality assessment capabilities for health literacy intervention studies. Additional quality assessment considerations for randomized controlled trials and non-randomized studies were informed by established guidelines (Higgins et al., 2016; Sterne et al., 2016).

Table 2. The criteria to evaluate the selected articles

Research design	Assessment criteria
Qualitative	QA1: Is the qualitative approach appropriate to answer the research question? QA2: Are the qualitative data collection methods adequate to address the research question? QA3: Are the findings adequately derived from the data? QA4: Is the interpretation of results sufficiently substantiated by data? QA5: Is there coherence between qualitative data sources, collection, analysis and interpretation?
Quantitative (descriptive)	QA1: Is the sampling strategy relevant to address the research question? QA2: Is the sample representative of the target population? QA3: Are the measurements appropriate? QA4: Is the risk of nonresponse bias low? QA5: Is the statistical analysis appropriate to answer the research question?
Quantitative (non-randomised)	QA1: Are the participants representative of the target population? QA2: Are measurements appropriate regarding both the outcome and intervention (or exposure)?

[illegible]

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1)								
Lim et al. (2025)	QL	√	√	√	√	√	5/5	√
5)								
Gille et al. (2021)	M	√	√	√	×	√	4/5	√
1)								
Song et al. (2021)	QL	√	√	√	√	√	5/5	√
1)								
Harris & Rogers (2023)	M	√	√	×	×	√	3/5	√
3)								
Rief et al. (2017)	QL	√	√	√	√	√	5/5	√
7)								
Wang et al. (2017)	QN	√	×	√	√	√	4/5	√

Note: QA=Quality assessment; QN (DC)=Quantitative descriptive; QN (NR)=Quantitative non-randomised; QL=Qualitative; MX=Mixed-Method

2.8 Data Extraction and Data Synthesis

This study employed thematic synthesis within qualitative synthesis to analyze the included articles (Thomas & Harden, 2008), following a three-stage process: (1) Line-by-line coding: Two researchers (RG and YW) independently coded 16 literature texts using open coding to extract initial codes, and then used the Kappa coefficient to test the consistency of the coders ($k=0.82$). (2)

Developing descriptive theme: The initial codes were classified to form intermediate themes. (3) Generating analytical theme: The explanatory themes were derived by combining the Health Belief Model, Information Processing Theory, and Social Cognitive Theory. The following principles were strictly followed during the coding process: (1) data were extracted from the original reports; (2) descriptions that were unclear or lacked information were marked as 'unknown' to avoid subjective speculation. After the initial coding, the discrepancies were resolved through multiple discussions and re-verification, ultimately achieving complete consensus on all variables.

3. Results

3.1 Characteristics of the Eligible Studies

As shown in Table 4, the included studies demonstrated substantial methodological diversity across multiple geographic regions. The research encompasses studies from ten countries spanning Asia, Europe, and North America, with sample sizes ranged from 18 to 447 participants, all explicitly targeting older adult populations with age criteria ranging from ≥ 60 to ≥ 70 years depending on study context and regional standards. Methodological approaches include qualitative designs (42.9%), quantitative studies (28.6% including both descriptive and non-randomized designs), and mixed-methods investigations (28.6%). Hypertension literacy assessment varied considerably, utilizing established instruments such as HLS-SF12 and HK-LS alongside culturally adapted scales and innovative technological competency measures. Information behavior evaluation similarly employed diverse approaches, from traditional self-report measures to digital barrier assessments and behavioral tracking systems. This methodological heterogeneity provides a comprehensive foundation for examining the relationship between hypertension literacy and

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health information behaviors across varied sociocultural contexts. Contemporary research has expanded to include medication literacy assessment and its mediating effects on adherence behaviors among elderly populations (Shen et al., 2020; Saqlain et al., 2019).

Table 4. Characteristics of Included Studies

Study	Country	Sample Size	Age	HTN	Literacy Measure	Information Behavior Measure	Key Focus
Saen yabut et al. (2024)	Thailand	QL 240	≥60		Thematic framework	Focus group analysis	Community health literacy perspectives
Huy et al. (2024)	Vietnam	QND 385	≥60		HLS-SF12	Self-reported seeking behavior	Information seeking willingness
Sak et al. (2018)	Poland	QN 156	≥60		HK-L5S	Decision self-efficacy scale	Knowledge-behavior pathway
Darvishpour et al. (2022)	Iran	QN 205	≥60		Modified HLS-SF12	Self-management questionnaire	Cognitive processing barriers
Pongkiatchai et al. (2022)	Thailand	MX 180	≥60		Functional literacy scale	Nutritional behavior assessment	Nutrition information behavior
Xu et al. (2024)	China	QL 320	≥60			Interview framework	Proxy seeking behavior or scale
Elias et al. (2024)	USA	MX 447	≥60		PAM-13 SQ-3	Shared decision-making scale	Cultural decision-making
Andersson et al. (2021)	Sweden	QL 185	≥60			Interview guide	Self-management narrative
Lim et al. (2025)	Singapore	QL 280	≥60			Thematic analysis	Digital barrier assessment challenges
Gille et al. (2021)	Germany	MX 312	≥60		HLS-GER2	Information need evolution	Disease stage information needs
Song et al. (2021)	China	QL 450	≥60			mHealth competency	Behavioral change tracking
Harries & Rogers (2023)	USA	MX 89	≥60		TEP-2.0 MHL C-C	Technology acceptance scale	Technology readiness factors
Rief et al. (2017)	Switzerland	QL 220	≥70			Comprehension assessment	Health record utilization impact

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Note: Age criteria reflect inclusion parameters as reported in original studies and may represent inclusion criteria, sample characteristics, or recruitment targets. Study Design Abbreviations: QL = Qualitative; QN-DC = Quantitative Descriptive; QN-NR = Quantitative Non-Randomized; MX = Mixed Methods. Measurement Tool Abbreviations: HLS-SF12 = Short Form Health Literacy Scale 12-item; HK-LS = Hypertension Knowledge-Level Scale; PAM-13 = Patient Activation Measure-13; SQ-3 = Screening Questions for Limited Health Literacy; HLS-GER2 = Health Literacy Survey Germany-2; TEP = Technology Experience Profile; TRI 2.0 = Technology Readiness Index 2.0; MHLC-C = Multidimensional Health Locus of Control-Chinese; BHLS = Brief Health Literacy Screening.

A total of 14 studies (Multimedia Appendix 2) were culled from the 3215 initially examined via systematic review. The included studies spanned from 2017 to 2025, with 85.7% (12/14) published within the past five years (Figure 2). The included literature covers multiple regions, including Asia (Thailand, Vietnam, China, Iran, and Singapore) and Europe and the United States (Switzerland, Germany, and Sweden). Among these, 57.1% (8/14) of the studies were conducted in developing countries and 42.9% (6/14) in developed countries (Fig 3). Research methods were mainly quantitative cross-sectional surveys (50%), supplemented by qualitative focus groups and interviews (28.6%) and mixed-methods designs (21.4%), mostly using standardized scales (e.g., HLS-SF12, HK-LS) or thematic analytic

frameworks. The core dimensions of HLS literacy included information access (71.4% of studies emphasized medical staff and family support), information comprehension (64.3% of studies focused on terminology simplification and visualization tools), information assessment (78.6% of studies revealed trust in physicians over the Internet) and information application (92.9% of studies focused on medication adherence and lifestyle interventions). Health information behavior showed three patterns: information seeking was dominated by family/community networks (Asia) or digital tools (Europe and the United States), information assessment relied on source authority and cultural context, and information adoption was influenced by self-efficacy, family support and mHealth real-time feedback. Instruments included disease-specific scales (HTN-SCPB, HELIA) and generalized scales (eHEALS).

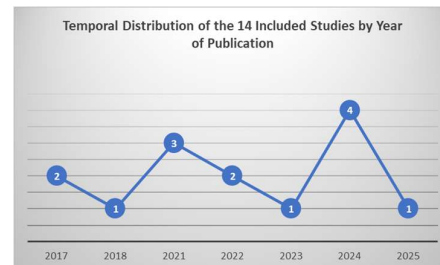


Fig 2. Temporal Distribution of the 14 Included Studies by Year of Publication

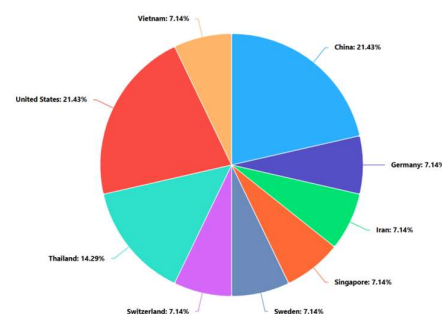


Fig 3. Countries where the selected studies were conducted

3.2 Dimensions and Assessment Tools of Hypertension Health Literacy

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This systematic review, incorporating 14 studies, systematically elucidates the complete competency spectrum in hypertension health management through a three-dimensional dynamic model of health literacy developed based on the expanded framework proposed by Nutbeam (2000), revealing the progression from information acquisition to practical application at the individual level.

Approaches to studying Hypertension literacy exhibit a multidimensional, cross-cutting character. Saenyabutr et al. (2024) distilled four core dimensions of information acquisition (Theme I), comprehension (Theme II), assessment (Theme III), and application (Theme IV) through focus group interviews, with a special emphasis on the trust-driven mechanism of assessing information and the application of competence (2024) used the Short form of health literacy questionnaire 12 items (HLS-SF12) to systematically assess individuals' performance on the four levels of accessing, understanding, assessing, and applying health information through three subscales: healthcare, disease prevention, and health promotion. In terms of tool development, Sak et al. (2018) constructed a hypertension knowledge assessment system based on the Hypertension Knowledge-Level Scale (HK-LS), which retained the four high-loading dimensions of definition, medical treatment, medication adherence, and complications through factor analysis; Pongkiatchai et al. (2022), on the other hand, focused on nutritional literacy and constructed a three-dimensional assessment framework encompassing nutritional knowledge acquisition, food consumption patterns, and self-management ability, with a special focus on the correlation between patients' daily dietary behaviors and health management.

Research on hypertension literacy has shown significant interdisciplinary characteristics. Xu et al. (2024) used in-depth

interviews to reveal the dual connotation of information assessment ability - both critical evaluation of medical information (e.g., assessment of the efficacy of new medications) and the ability to screen information on the Internet; Andersson et al. (2021) used a mixed research approach to construct an assessment system from three dimensions: knowledge acquisition (perception of blood pressure fluctuations), participation initiative (quality of doctor-patient interactions), and self-management (home monitoring and doctor-patient communication), with self-management ability placing particular emphasis on the patient's sense of responsibility for blood pressure control. Exploration of the technology dimension is noteworthy, as Harris & Rogers (2023) assessed patients' self-management ability through the Technology Experience Profile (TEP), Technology Readiness Index 2.0 (TRI 2.0), and Multidimensional Health Locus of Control (MHLC-C), combined with semi-structured interviews, revealed the interactive effects of frequency of technology tool use, propensity for acceptance, and health control beliefs on self-management skills.

Additionally, hypertension literacy measurement tools demonstrated considerable diversity. Elias et al. (2024) used the Patient Activation Measure-13 (PAM-13) scale to assess the knowledge dimension, while combining the Screening Questions for Limited Health Literacy (SQ-3) to measure basic information processing skills; Song et al. (2021) proposed a three-dimensional model incorporating mobile device information acquisition, vital sign assessment, and self-management skills through semi-structured interviews, in which assessment skills were redefined as the process of integrating real-time health monitoring with behavioral feedback. Gille et al. (2021) used the Second Health Literacy Survey Germany

(HLS-GER2) quantitative data with focus group qualitative analysis to reveal group characteristics of chronic disease patients regarding information interests, source preferences, and management challenges. Wang et al. (2017) used the Brief Health Literacy Screening (BHLS), an assessment system was constructed from three practice dimensions: information acquisition (dependence on reading medical materials), comprehension (ability to interpret complex text), and application (confidence in filling out medical forms autonomously), with a special emphasis on the impact of terminology comprehension and information integration skills on health management.

3.3 The Effect of Hypertension Literacy on Older Adults' Information Seeking Behaviors

Numerous studies have shown a significant positive association between hypertension literacy and health information-seeking behavior among older adults, which is manifested through a multilevel mediating pathway (Saenyabutr et al., 2024; Sak et al., 2018; Darvishpour et al., 2022; Pongkiatchai et al., 2022). Several studies have shown that older adults with higher hypertension literacy tend to exhibit more positive information-seeking behaviors and that they are able to identify, understand, and apply health information more effectively. For example, Saenyabutr et al. (2024) found that Thai older adults with higher hypertension literacy were able to access information through multiple channels, whereas the less literate group relied primarily on healthcare professionals as a single source of information, resulting in limited information diversity. This difference manifests not only in the breadth of information access channels but also extends to the depth of information content, as the group with high hypertension literacy demonstrated a greater likelihood of acquiring

multidimensional knowledge encompassing diet, exercise, and other aspects, which in turn supported their behavioral change. Huy et al. (2024) further noted that older adults with high hypertension literacy were more aware of the importance of health information and therefore actively search for information through channels such as medical consultations or the Internet, and this active information-seeking behavior helps to improve their self-care and blood pressure control.

The mechanisms by which hypertension literacy influences information-seeking behavior involve multiple dimensions, including knowledge, psychology, and technology. Sak et al. (2018) stated that hypertension literacy indirectly promotes information seeking willingness by enhancing hypertension knowledge ($P < .05$) and psychological empowerment ($P < .05$). Hypertension literacy determines whether older adults are information seekers or information avoiders. Older adults with high hypertension literacy are information seekers, and those with low hypertension literacy are information avoiders. In addition, technical factors cannot be ignored. Lim et al. (2025) found that older adults with lower hypertension literacy often had insufficient digital skills to effectively utilize online resources, whereas high hypertension literacy groups were more likely to overcome technological barriers to expand the breadth and depth of their information search via the Internet. This difference was particularly pronounced in resource-poor areas, where economic constraints and inadequate community support further amplified the impact of literacy on information seeking (Saenyabutr et al., 2024).

Meanwhile, hypertension literacy influences older adults' information-seeking source preferences. Medical professionals remain the preferred and most trusted source of

health information for older adults with hypertension (Saenyabutr et al., 2024; Sak et al., 2018), but the Internet also holds a place among information seekers (Gille et al., 2021; Pongkiatchai et al., 2022; Andersson et al., 2021). Self-efficacy emerges as a critical factor in health information seeking patterns, particularly in culturally diverse populations (Khairy et al., 2021; ALruwaili, 2024). However, the Internet had the lowest trustworthiness score in the total sample (Saenyabutr et al., 2024). In addition, older adults with high hypertension literacy are more concerned about their condition, actively seek information to better manage their disease, and are more willing to utilize modern technology and diverse channels to obtain information (Sak et al., 2018; Andersson et al., 2021).

The performance of information-seeking behavior is also dynamically moderated by the stage of the disease process and social factors. Gille et al. (2021) found that the health information needs of patients with chronic diseases evolve with the course of the disease. Hypertensive patients had low information needs in the early stages of diagnosis due to psychological shock, but information needs increased significantly with disease duration. Physicians are the most preferred source of information for patients with chronic diseases, but insufficient communication time and information presentation by physicians may diminish the utility of information, leading patients to turn to other sources of information, especially the Internet. Meanwhile, family members and pharmacies serve as secondary sources of information to help patients interpret complex information. Help-seeking behaviors among older adults follow distinct patterns, with comprehensive scoping reviews identifying key facilitators and barriers (Teo et al., 2022; Li et al., 2021). Elias et al. (2024) identified hypertension literacy, education level, patient activation, and racial-ethnic

background as key factors influencing older adults' health information-seeking behavior. Additionally, social networks also have an impact on the information-seeking behavior of older adults, who typically obtain health information from healthcare professionals, friends, and family, and are willing to learn from social networks and online resources to make healthier self-care choices. In resource-poor areas, economic constraints and community support become the fifth dimension of hypertension literacy, directly affecting information seeking. As mentioned by Saenyabutr et al. (2024), the inaccessibility of smartphones and the insufficient implementation of health policies limit older adults' access to information. Lim et al. (2025) also pointed out that older hypertensives with low hypertension literacy face significant technological barriers to accessing online health resources, and that affects their ability to use technology, which in turn limits information seeking.

3.4 The effect of Hypertension Literacy on Health Information Assessment Behavior in Older Adults

Hypertension literacy influences older adults' information assessment behavior through multidimensional pathways such as knowledge base, decision-making self-efficacy, technological competence, and social support. Older adults with low hypertension literacy tend to use medical personnel as an alternative mechanism for information assessment, and their trust stems from passive acceptance of authoritative information (Saenyabutr et al., 2024; Elias et al., 2024). For example, patients believe that "doctor's advice does not need to be verified" (Family Male, 32 years), and this trust reliance leads to a weakening of information appraisal behavior (Darvishpour et al., 2022). However, individuals with higher hypertension literacy actively validate information sources (e.g., consulting a

physician rather than blindly following web content) through knowledge base (e.g., screening for evidence-based treatment options) and decision self-efficacy (DSE) enhancement (Huy et al., 2024; Pongkiatchai et al., 2022). Notably, even though individuals with high hypertension literacy are skeptical of unofficial channels (e.g., YouTube), they still compensate for trust deficits through cross-validation (e.g., authoritative medical websites) (Sak et al., 2018; Lim et al., 2025), forming a relationship between “authoritative trust” and “Critical Evaluation” dynamic equilibrium.

Building upon these findings, hypertension literacy also indirectly affects information assessment behavior through enhanced decision self-efficacy (DSE). Sak et al. (2018) found that baseline DSE was strongly correlated with hypertension knowledge ($r=0.71$), and that post-intervention DSE enhancement significantly strengthened information evaluation ($F=28.25$). Individuals with high hypertension literacy showed stronger psychological empowerment (mean score of 2.47 in the intervention group vs. 1.94 in the control group), which prompted them to screen information (e.g., distinguishing between reliable sources) based on their condition (Sak et al., 2018). Meanwhile, hypertension knowledge level directly influences information screening criteria: highly literate individuals (HK-LS = 7.66) are more likely to proactively assess quality, whereas low literate individuals (HK-LS = 6.12) rely on passive reception (Sak et al., 2018). This difference was particularly significant when technical skills were limited ($\beta = -0.24$), reflecting the constraints of cognitive load on assessment behavior (Sak et al., 2018; Xu et al., 2024).

However, although highly hypertensive literates compensate for technological deficiencies (e.g., validating authoritative

websites) through electronic health literacy, only 12% of older adults consult multiple sources of information (Sak et al., 2018). Technological capacity deficits cause some highly literate individuals to forgo online assessments (Xu et al., 2024). Social support plays a key role in this process, with family members helping to make sense of complex information (e.g., medication instructions) and patient groups validating lay advice through social interactions (Lim et al., 2025; Gille et al., 2021). For example, older adults are more likely to trust information forwarded by their children (a50) and official hospital accounts (a53), forming a “family proxy-social network” assessment pathway (Xu et al., 2024). However, blind adherence to non-professional sources (e.g., friends' prescriptions) by low-literate individuals may still lead to misjudgments (Lim et al., 2025).

Furthermore, massive amounts of health information trigger decision fatigue, and older adults turn to simplified assessment criteria (e.g., “highly-liked” content) (Xu et al., 2024). Song et al. (2021) noted that mHealth tools mitigate information overload by translating abstract knowledge into practical behaviors through embodied cognition (e.g., blood pressure trend maps). The tracking tools developed by Rief et al. (2017) assist low-literate individuals in identifying patterns through data visualization, thereby enhancing assessment depth, translating abstract knowledge into practical behaviors, and mitigating information overload. However, patients in the middle of the disease course (6 - 10 years) have a significant decline in assessment ability due to cognitive load resulting from long-term information accumulation (Gille et al., 2021).

Meanwhile, hypertension literacy and cultural context together shape assessment strategies. African Americans use “race-specific risk perceptions” (e.g., high

prevalence of hypertension) as a motivation for assessment (Elias et al., 2024), whereas highly educated populations rely on self-directed knowledge rather than doctor-patient communication (Elias et al., 2024). Technology acceptance behaviors further map literacy differences: highly hypertension literate individuals evaluate the balance between privacy risks and health benefits, whereas low-literate individuals abandon technology due to operational complexity (Harris & Rogers, 2023). For example, blood pressure monitors are accepted for simplicity of operation, while multifunction robots are rejected for complexity of steps (Harris & Rogers, 2023).

Finally, highly hypertensive-literate individuals ultimately optimize their decision-making through critical assessment of health information, including validating the scientific basis of medical advertisements (Pongkiatchai et al., 2022). In contrast, those with low hypertensive literacy often develop self-care biases that result in incorrect medication use and other adverse outcomes due to systematic miscalculations in processing health information (Darvishpour et al., 2022). Wang et al. (2017) emphasized that hypertension literacy not only affects information acquisition, but also determines critical appraisal skills. For example, people with low hypertension literacy misjudged the importance of information due to their inability to understand “target organ damage” (Rief et al., 2017). Ultimately, information-assessment behaviors close the loop with health behaviors: mHealth translates assessment results into practice through immediate feedback (Song et al., 2021).

3.5 The effect of Hypertension Literacy on Health Information Adoption Behavior in Older Adults

The mechanism by which hypertension literacy influences health information adoption

behavior among older adults is characterized by the dynamics of multidimensional interactions. Existing studies have shown that hypertension literacy shapes the information adoption logic of older adults through the triple path of cognitive reconfiguration, social context embedding, and technological empowerment. At the cognitive level, hypertension literacy constitutes the knowledge base of information processing ability, and the difference in its level directly affects the older adults' screening framework of health information. Lower hypertension literacy groups tend to fall into the cognitive trap of “passive adoption” due to insufficient knowledge (Saenyabutr et al., 2024) and lack of critical appraisal skills (Xu et al., 2024) - over-reliance on a single authoritative source at the expense of individualized needs (Gille et al., 2021). This path dependency in information screening leads to limited breadth of adoption behavior. It is worth noting that knowledge reserve does not work in isolation, but rather forms the motivation for behavioral transformation through the mediating effect of self-efficacy (Darvishpour et al., 2022). When hypertension literacy breaks through the 109-point critical threshold, the individual's ability to assess the credibility of the information and judge the feasibility of the solution undergoes qualitative changes, forming a mechanism for the leap from cognitive reserve to behavioral practice.

The moderating role of social context injects dynamic complexity into this mechanism. Family involvement (Saenyabutr et al., 2024) and community interactions (Pongkiatchai et al., 2022) reconfigure the field of information adoption among older adults through the reinforcement of trust and the internalization of social norms. Low hypertension literacy groups can achieve “alternative literacy compensation” (Lim et al., 2025) with structural support, e.g., through

information screening by family members to overcome individual cognitive limitations. This social embeddedness is particularly evident in the cultural safety dimension - African-American patients reconfigured hypertension management as a community collective action (Elias et al., 2024), suggesting that information adoption is not only an individual cognitive process, but also a social practice of decoding cultural metaphors. Adoption likelihood was significantly higher when health information could be translated into embodied solutions such as recipe modification for specific ethnic groups, revealing the boundary conditions of cultural appropriateness in the literacy-behavior transformation chain.

Meanwhile, the use of technological tools has given rise to a new type of adoption mechanism. mHealth extends the information processing capacity of older adults in the spatial and temporal dimensions through quantitative self-monitoring (Andersson et al., 2021) and re-accessible education content (Song et al., 2021). This data-driven adoption strategy not only enhances the bargaining power of individuals in the doctor-patient dialogue, but also reconfigures the traditional power structure of health information, as the highly literate group is empowered by technology to achieve “patient expertization” and pattern recognition through the accumulation of personal health data. It is worth noting that there is significant heterogeneity in the benefits of technological empowerment - low literacy groups may experience “digital anxiety” due to interface complexity and information overload (Gille et al., 2021), suggesting that technological interventions need to be dynamically matched to literacy levels.

At the end of behavioral transformation, hypertension literacy achieves health activation through a dual pathway. The first is

the cognitive-emotional activation pathway: highly literate individuals form motivational reinforcement through threat perception (e.g., risk of uncontrolled blood pressure) and benefit assessment (e.g., successful cases of blood pressure control) (Song et al., 2021), and this emotional activation breaks through the linear assumption of the traditional health belief model to form a cognitive-emotional synergistic mechanism. The second is the structural-energetic interconstructive path: alternative support systems such as community health stations (Lim et al., 2025) interact with individual literacy levels, and when structural resources are matched with individual energetics, information adoption is upgraded from discrete behaviors to continuous self-management practices. The existence of this dual pathway explains why some low-literacy groups can still achieve effective information adoption in community interventions, whereas high-literacy individuals may experience “knowledge sinking” in resource-poor contexts (Elias et al., 2024).

The synthesized evidence presented in Table 5 reveals consistent patterns across the three domains of health information behavior among older adults with hypertension. The findings demonstrate a clear literacy gradient, where individuals with higher hypertension literacy exhibit active multi-channel information seeking, critical assessment capabilities, and successful behavioral adoption, while those with lower literacy rely predominantly on single authoritative sources, trust-dependent evaluation mechanisms, and passive acceptance patterns. High-quality studies consistently support the existence of threshold effects and compensatory mechanisms, with technology emerging as both an empowering tool and a significant barrier depending on individual literacy levels and digital competency.

Table 5. Key Findings on Hypertension Literacy and Information Behavior

Study	Information Seeking Findings	Information Assessment/Adoption Findings	Quality
Saenyabutr et al. (2024)	High literacy: multiple channels; Low literacy: single source	Trust-driven assessment; passive adoption in low literacy	High
Huy et al. (2024)	High literacy promotes active seeking behavior	Enhanced self-care blood pressure control	Moderate
Sak et al. (2018)	Knowledge enhances seeking willingness (P<.05)	DSE-knowledge correlation (r=0.71); psychological empowerment	High
Darvishpour et al. (2022)	Limited diversity in literacy groups	Authority low reliance weakens critical appraisal	Moderate
Pongkiatchai et al. (2022)	Multi-channel access varies by literacy level	Critical evaluation affect adoption success	Moderate
Xu et al. (2024)	Family proxy seeking compensates digital barriers	Cross-validation strategies in high literacy groups	High
Elias et al. (2024)	Social networks influence	Cultural factors reshape adoption mechanisms	High

Study	Information Seeking Findings	Information Assessment/Adoption Findings	Quality
Andersson et al. (2021)	seeking patterns mHealth enables proactive monitoring	Data visualization enhances patient empowerment	High
Lim et al. (2025)	Technology barriers limit access low literacy	Digital anxiety prevents in technology adoption	High
Gille et al. (2021)	Information needs evolve with disease duration	Assessment ability varies by disease stage	Moderate
Song et al. (2021)	Emotional triggers activate information seeking	Embodied cognition bridges knowledge-behavior gap	High
Harris & Rogers (2023)	Technology acceptance varies by complexity	Privacy-benefit evaluation by adoption decisions	Moderate
Rief et al. (2017)	Visual tools motivate systematic tracking	Immediate feedback creates behavioral reinforcement	High
Wang et al. (2017)	Literacy determines active vs. passive patterns	Comprehension barriers limit effective adoption	Moderate

Note: Quality Ratings: High = 5/5 MMAT

criteria; Moderate = 3-4/5 MMAT criteria

DSE = Decision Self-Efficacy; MMAT = Mixed Methods Appraisal Tool

4. Discussion

This systematic review of 14 studies demonstrates that hypertension literacy significantly influences health information behaviors among older adults. The influence operates through three interconnected mechanisms: knowledge-mediated pathways that enhance disease awareness, psychological empowerment pathways that strengthen decision-making self-efficacy, and technology-facilitated pathways that develop digital competencies. The evidence reveals a clear literacy gradient wherein individuals with higher hypertension literacy demonstrate active multi-channel information seeking, critical assessment capabilities, and successful behavioral adoption, while those with lower literacy rely predominantly on single authoritative sources, exhibit trust-dependent evaluation mechanisms, and display passive acceptance patterns (Saenyabutr et al., 2024; Huy et al., 2024; Sak et al., 2018). The relationship operates through nonlinear threshold effects rather than simple dose-response mechanisms, with compensatory social support systems serving as crucial moderating factors that can partially offset individual literacy limitations (Darvishpour et al., 2022; Xu et al., 2024).

The findings of this review extend previous systematic reviews that examined general health literacy without specifically addressing hypertension-focused competencies or age-specific mechanisms. Marshall et al. (2025) identified passive information-seeking patterns in 64% of older adults with limited health literacy compared to 23% among those with adequate literacy, which aligns with the trust-dependency patterns observed in the current analysis. Chang et al. (2021) focused on eHealth literacy interventions, while this

study advances understanding by revealing specific mechanisms through which hypertension literacy influences information behavior, particularly the "trust anchoring effect" demonstrated by Saenyabutr et al. (2024) and the "technology empowerment paradox" identified by Lim et al. (2025) that were not previously characterized in the literature.

The evidence also contrasts with earlier assumptions about linear literacy-behavior relationships. Network meta-analyses by Yuan et al. (2024) and Hassan et al. (2023) suggested that different intervention approaches show varying effectiveness in improving medication adherence, requiring personalized strategies. This review provides the theoretical foundation for such personalization by identifying threshold effects demonstrated by Wang et al. (2017) and compensatory mechanisms revealed by Xu et al. (2024) that explain why standardized interventions may fail for certain literacy subgroups. Cross-cultural studies by Wang et al. (2024) and Jiang et al. (2024) demonstrate significant variations in eHealth literacy levels, while the cultural safety framework identified by Elias et al. (2024), particularly findings on collective decision-making patterns among African American patients, represents a novel contribution that extends beyond previous reviews focused primarily on individual-level factors. The COVID-19 acceleration of digital health adoption highlighted by Choukou et al. (2022) and Choudhary & Bansal (2022) underscores the importance of addressing digital divides through structured literacy training programs.

The theoretical framework presented in Figure 4 illustrates the multidimensional mechanisms through which hypertension literacy influences health information behavior among older adults. This review contributes to health information behavior theory by

proposing a dynamic integration model that transcends Nutbeam's (2000) traditional three-dimensional framework. The evidence supports the addition of a fourth dimension—cultural translation competence—that captures how older adults adapt health information to their sociocultural contexts, as demonstrated by Elias et al. (2024). The identification of threshold effects (Sak et al., 2018; Wang et al., 2017) challenges linear assumptions in existing health literacy models, suggesting that interventions must achieve minimum effective literacy levels before behavioral changes occur. The concept of "digital health literacy compensation" through social networks, as revealed by Xu et al. (2024) and Lim et al. (2025), represents a theoretical advancement demonstrating how collective competencies can substitute for individual limitations. Self-efficacy emerges as a critical factor in health information seeking patterns, particularly in culturally diverse populations (Khairy et al., 2021; ALruwaili, 2024). Help-seeking behaviors among older adults follow distinct patterns, with comprehensive scoping reviews by Teo et al. (2022) and Li et al. (2021) identifying key facilitators and barriers that complement the findings of this review.

information Behavior in Older Adults

The clinical implications of these findings are substantial for hypertension management in aging populations. Healthcare providers should implement literacy-stratified patient education approaches, with high-literacy patients benefiting from evidence-based resources and autonomous decision-making tools demonstrated by Harris & Rogers (2023), while low-literacy patients require simplified, trust-based interventions delivered through established provider relationships as shown by Darvishpour et al. (2022). The threshold effect findings by Sak et al. (2018) suggest that clinical assessments should identify patients below critical literacy levels for intensive support, while those above thresholds may benefit from advanced self-management technologies like those described by Andersson et al. (2021) and Song et al. (2021). The role of family proxy support in information seeking identified by Xu et al. (2024) indicates that clinical care models should formally integrate family members as information mediators, particularly for patients with limited digital competencies. Healthcare systems should also recognize that technology adoption varies significantly by literacy level, requiring differentiated implementation strategies for digital health tools, as demonstrated by the visualization approaches developed by Rief et al. (2017) and the mHealth interventions studied by Song et al. (2021). Medication literacy assessment and its mediating effects on adherence behaviors among elderly populations, as shown by Shen et al. (2020) and Saqlain et al. (2019), should be incorporated into routine clinical practice.

The evidence supports several policy-level interventions to address health information disparities among older adults with hypertension. Health literacy screening should be integrated into routine clinical assessments to enable targeted interventions,

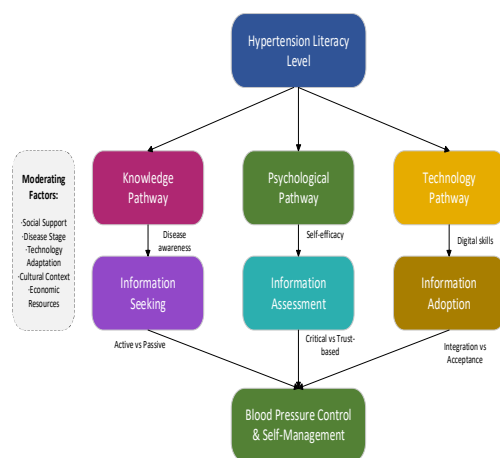


Figure 4. Theoretical Framework of Hypertension Literacy Impact on Health

with particular attention to identifying patients below critical threshold levels identified by Wang et al. (2017). Community health programs should incorporate intergenerational knowledge transfer models that leverage family networks while providing professional guidance to prevent misinformation propagation, as suggested by the findings of Gille et al. (2021). Digital health initiatives require accessibility standards that accommodate varying literacy levels, including simplified interfaces for low-literacy users and advanced analytics for high-literacy individuals, addressing the digital divides identified by Lim et al. (2025). The cultural appropriateness findings from Elias et al. (2024) suggest that health information systems need localization frameworks that translate medical concepts into culturally relevant contexts. Healthcare financing policies should recognize the additional time and resources required for literacy-appropriate care delivery, particularly for vulnerable populations identified in studies by Saenyabutr et al. (2024).

Several limitations constrain the generalizability and interpretation of these findings. The heterogeneity in hypertension literacy measurement tools across studies, as evidenced by the diverse approaches used by different researchers from Sak et al. (2018) to Pongkiatchai et al. (2022), limited direct comparisons and precise determination of threshold effects. The predominant reliance on self-reported information behavior measures may introduce social desirability bias and fail to capture actual behavioral patterns in real-world contexts. The cross-sectional design of most included studies precludes causal inferences about the direction of relationships between literacy and information behaviors. Geographic concentration in certain regions may limit cultural generalizability, particularly given the emphasis on cultural translation

competencies in the theoretical framework. The scarcity of longitudinal intervention studies limits understanding of how literacy-behavior relationships evolve over time and respond to targeted interventions. The methodology employed in this review followed established guidelines (Thomas & Harden, 2008; Hong et al., 2018) with quality assessment using validated tools (Souto et al., 2015; Higgins et al., 2016; Sterne et al., 2016), though the mixed-methods approach described by Pollock et al. (2020), Jordan & Pilla (2024), and Munn et al. (2018) and search strategies following PRISMA-S guidelines (Rethlefsen et al., 2021) ensured methodological rigor. Future research should develop standardized measurement frameworks that incorporate cultural appropriateness indices, employ mixed-methods longitudinal designs to track dynamic processes, and conduct culturally adapted intervention studies to establish evidence-based implementation strategies.

5. Conclusion

Based on the systematic integration and analysis of 14 included literatures, this study reveals the multilevel influence mechanism of hypertension literacy on the health information behavior of older adults (covering information search, assessment, and adoption) and its important practical significance. Hypertension literacy is a dynamic system composed of knowledge reserve, information processing skills, psychological empowerment, and cultural adaptability, and its mechanism of action is characterized by nonlinearity, threshold effect, and context-dependence. In terms of theoretical contributions, hypertension literacy affects health information behavior there is a core mechanism, there is a nonlinear threshold effect and cognitive liberation, that is, there is a threshold, over the threshold of information behavior of older people from passive acceptance to active construction, low

hypertension literacy older people rely on the “Trust Alternative Evaluation”, high hypertension literacy older people through the “Evidence Validation System”. There are also multidimensional interaction paths, including cognitive, social, and technological paths, and there are corresponding influencing factors in each path; at the same time, cultural appropriateness has a borderline role, and neglecting localization and translation may trigger adoption resistance. The practical implication is that the intervention strategy needs to be precise and accurate. These findings have important clinical implications, suggesting that intervention strategies should be tailored based on individual literacy levels, adopting a tiered intervention strategy, breaking through the “minimum effective literacy threshold” for low-hypertension literate older adults, and strengthening advanced information skills for high-hypertension literate older adults; grasping the timing of dynamic interventions, focusing on emotional support at the early stage of diagnosis, and coping with the peak of cognitive load in the middle of the course of the disease; and following the principle of matching technology with literacy, and taking into account both the technology and the literacy of the older adults. The principle of technology-literacy matching should be followed, taking into account the ease of use of technology and cultural safety. Future research needs to continue to explore the theoretical integration, the innovation of measurement tools (developing a scale that includes a cultural appropriateness index), and the deepening of methodology (combining longitudinal tracking and narrative analysis), to provide better theoretical foundations and practical guidance for narrowing the health information gap.

Limitations

There are some limitations of this study. In terms of measurement tools, there was significant heterogeneity in the hypertension literacy measurement tools, with different studies using comprehensive assessments based on the Nutbeam three-dimensional dynamic model or tools focusing on specific dimensions, leading to conceptual fragmentation and ambiguous threshold effects, which limited the comparability of the findings of different studies. Information behavior measures are also deficient, with most relying on subjective reports that are prone to bias and lacking observations of behavior in real-life scenarios. In terms of confounding variable control, social support was not effectively quantified, and cognitive decline interference in older samples was not adequately controlled. In terms of practical insights, intervention studies are scarce and difficult to prove causality; future studies can develop an integrative measurement framework, deepen mechanism studies using mixed methods, apply longitudinal designs and conduct heterogeneity analysis, and conduct culturally adapted intervention studies to break through these limitations, establish more accurate theoretical models, and provide empirical evidence for health information services for hypertension in the elderly.

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