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# A Review of Older Adults' Digital Health Information Interaction: A Human–Computer Interaction Perspective

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**ABSTRACT:** With the rapid development of digital health services and the accelerating aging of the population, older adults have become important users of digital health information systems. However, cognitive aging, limited digital literacy, and differences in social support often create barriers and risks in their interaction with digital health platforms. From a human–computer interaction perspective, this paper systematically reviews existing research on older adults' digital health information interaction. It summarizes major behavior patterns such as information seeking, surrogate searching, continued use, adoption, and avoidance, and analyzes interaction characteristics in risk contexts including conflicting information, short-video misinformation, and algorithmic recommendation environments. The paper further reviews studies on age-friendly interaction design in health apps, mobile medical services, and smart health systems, and discusses emerging issues related to human–AI interaction, such as affordance-based design, conversational systems, and trust calibration in large language models. The review identifies key limitations in existing studies and highlights the need to strengthen interaction-oriented analysis, cognitive support, and trust-aware design in intelligent health information environments.

**KEYWORDS:** older adults; digital health information; human–computer interaction; age-friendly design; human–AI interaction

## I. INTRODUCTION

Against the dual backdrop of deepening population aging and the rapid development of digital health services, older adults are gradually becoming important users within the digital health information environment. Platforms such as WeChat, short-video applications, health apps, online medical platforms, smart health terminals, and large-model–driven conversational systems are reshaping the ways in which older adults obtain, understand, evaluate, adopt, and use health information. At the same time, due to cognitive aging, limited digital literacy, insufficient technological experience, and differences in social support, older adults face notable operational barriers, cognitive burdens, and risk exposure during their interactions with digital health information systems. Consequently, the question of how older adults interact with digital health information systems has emerged as an issue of both theoretical importance and practical relevance.

Existing studies have examined older adults' online health information seeking, surrogate seeking, continued use, information avoidance, misinformation adoption, and age-friendly design of health apps from various perspectives. On the one hand, these studies have revealed major types and influencing factors of older adults' digital health information behaviors, such as active surrogate seeking, continued use, social media–based health information seeking, information avoidance and circumvention, among others [1–9]. On the other hand, researchers have begun to pay attention to issues faced by older adults in risk information environments, including information overload, misjudgment of credibility, algorithm-induced avoidance, and the adoption of false health information in live-streaming contexts [10–14]. Meanwhile, research on age-friendly interaction in health apps, digital medical applications, smart health information systems, and health management terminals has gradually expanded from general usability analysis to aspects such as task hierarchy, user experience evaluation, value realization, privacy disclosure, and multi-source data integration in system design [15–22]. Building on this foundation, emerging technological scenarios represented by large language



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models, conversational systems, and human–AI collaboration are further promoting research on older adults’ digital health information interaction, shifting the focus from human–computer use to human–AI interaction, and introducing new topics such as trust calibration, affordance mapping, and age-friendly intelligent dialogue design [23–25].

Nevertheless, several limitations remain in the existing literature. First, many studies are conducted from the perspectives of information behavior, health communication, or information services. Although these studies reveal certain patterns in older adults’ health information use, they pay insufficient attention to typical HCI issues such as interaction interfaces, task processes, system feedback, and cognitive support. Second, research on risk environments has mainly focused on information authenticity, adoption bias, and avoidance behavior, while failing to incorporate cognitive load, interface design, recommendation logic, and interaction support mechanisms within risk contexts into an integrated analytical framework. Third, as large language models, conversational systems, and intelligent health services increasingly enter the daily lives of older adults, existing research has not yet formed a systematic review of older adults’ digital health information interaction under conditions of human–AI interaction, leaving substantial room for theoretical integration and design-oriented exploration [23–25].

Against this background, this study takes “older adults—digital health information—interaction processes” as its central analytical line and provides a systematic review of related research from a human–computer interaction perspective. The paper is organized into eight sections. First, it clarifies the research foundations and analytical framework of older adults’ digital health information interaction. Second, it reviews the foundational research on older adults’ digital health information behaviors. Third, it discusses health information interaction among older adults in risk contexts. Fourth, it summarizes studies on age-friendly interaction in health apps, mobile health services, and smart health systems. Fifth, it analyzes human–AI interaction and emerging technological scenarios. Finally, it offers a comprehensive assessment of existing research progress, limitations, and directions for theoretical integration, and proposes future research prospects.

This study aims to provide a systematic reference for advancing research on older adults’ digital health information from behavioral studies to interaction-oriented research, and from technology acceptance to cognitive support and trust calibration.

## II. RESEARCH FOUNDATIONS AND ANALYTICAL FRAMEWORK OF OLDER ADULTS’ DIGITAL HEALTH INFORMATION INTERACTION

### (1) Definition of Core Concepts

“Older adults’ digital health information interaction” does not merely refer to the static fact that older adults are exposed to digital health information. Rather, it emphasizes the dynamic interaction processes that occur between older adults, health information, technological media, and social support networks across digital platforms, health apps, online medical services, short-video platforms, smart health terminals, and emerging intelligent systems. Such processes involve multiple stages, including information seeking, content recognition, credibility assessment, information adoption, continued use, avoidance and circumvention, information sharing, and surrogate seeking [1–3,7,9,26].

From the perspective of research subjects, the older population exhibits substantial heterogeneity in health status, technological experience, digital literacy, cognitive abilities, emotional needs, and social support. This heterogeneity implies that their interaction processes display notable differentiated characteristics [17,20,27]. From the perspective of research media, platforms such as WeChat, Douyin, Bilibili, health apps, mobile medical platforms, and smart health systems constitute the major environments in which older adults engage with digital health information [3,16,18,21,28]. From the perspective of research paradigms, existing studies mainly originate from fields such as information behavior, health communication, information services, design studies, and human–computer interaction, demonstrating a pronounced interdisciplinary nature [9,20,25,27].

### (2) Fundamental Characteristics of Older Adults’ Digital Health Information Interaction

First, older adults’ digital health information interaction is strongly driven by practical needs. Health management, chronic disease prevention and control, disease consultation, medication decision-making, and daily health maintenance constitute the primary motivations for older adults entering digital health information environments [1,20,21,28].



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Second, this interaction process is simultaneously influenced by individual, platform, and social factors. Older adults' health status, self-efficacy, degree of cognitive aging, and information literacy interact with platform characteristics such as information quality, interface design, system usability, and interaction complexity, as well as social factors including intergenerational support and broader social support, to jointly shape interaction outcomes [6–8,10–11,15,17,20].

Third, older adults' digital health information interaction exhibits cognitive, emotional, and relational dimensions. Beyond information comprehension and task completion, it also involves psychological and social processes such as anxiety, trust formation, risk perception, social dependence, and interpersonal collaboration [4,5,12,24,29].

Fourth, digital health information interaction is gradually shifting from simple information acquisition toward system use, platform dependence, and intelligent dialogue. Correspondingly, interaction objects are expanding from traditional interfaces to recommendation algorithms, intelligent service systems, and large-model-driven conversational systems [16,23–25].

### (3) Major Theoretical Foundations in Existing Research

From the perspective of theoretical sources, current research on older adults' digital health information interaction mainly relies on four categories of frameworks.

The first category includes theories related to technology acceptance and continued use, such as the Technology Acceptance Model (TAM), extended technology acceptance models, the Information Systems Success Model, and continuance intention models. These frameworks are primarily used to explain older adults' willingness to use and continue using health apps, online health platforms, and digital medical systems [2,20,30].

The second category comprises behavioral explanatory frameworks such as the Stimulus–Organism–Response (SOR) model, the Cognition–Affect–Conation (CAC) framework, and the Risk Information Seeking and Processing (RISP) model. These frameworks are used to analyze phenomena such as health information avoidance, circumvention, adoption, continued use, and emotional responses [1,4,5,29].

The third category includes theoretical perspectives such as the Means–End Chain theory, Social Cognitive Theory, and Life-Cycle Theory. These approaches are applied to describe the value mechanisms of online medical services, health information seeking behaviors on social media, and the developmental stages of older adults' online health information behavior [3,9,21].

The fourth category derives from human–computer interaction and design studies, including theories such as affordances, signifiers, task analysis, cognitive aging, and user experience evaluation. These theories mainly serve the design of age-friendly interfaces, interaction optimization, task hierarchy design, and research on human–AI interaction [15,17,18,22,23].

### (4) Analytical Framework of This Study

Building upon the aforementioned research foundations, this study proposes that research on older adults' digital health information interaction can be conceptualized as a progressive structure that evolves from behavior to design and from traditional interfaces to intelligent systems.

The first level concerns the foundations of digital health information behavior research, focusing on how older adults seek, adopt, use, or avoid information.

The second level addresses health information interaction under risk contexts, examining how older adults make judgments and respond in environments characterized by uncertainty, conflicting information, and misinformation.

The third level focuses on age-friendly interaction in health apps, mobile health services, and smart health systems, emphasizing how systems can be designed to better accommodate older adults' needs.

The fourth level concerns human–AI interaction and future technological scenarios, exploring how intelligent systems can establish relationships with older adults that are more interpretable, trustworthy, and collaborative.



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This framework integrates existing research findings and provides a systematic analytical pathway for future studies [9,16,23–25].

### III. FOUNDATIONS OF RESEARCH ON OLDER ADULTS' DIGITAL HEALTH INFORMATION BEHAVIOR

#### (1) Major Types of Older Adults' Digital Health Information Behavior

Existing studies indicate that older adults' digital health information behaviors are diverse and can be broadly categorized into several types, including active information seeking, surrogate searching, continued use, information adoption and sharing, as well as avoidance and circumvention.

First, active information seeking represents the most fundamental behavioral form. When middle-aged and older adults perceive health threats, wish to enhance their sense of health control, or need to make medical decisions, they tend to actively seek health information online. However, this process is jointly influenced by factors such as self-efficacy, interpersonal perceptions, and information overload [1]. In social media contexts, the health information seeking behaviors of middle-aged and older users on WeChat and Douyin (TikTok) also exhibit platform-specific differences: self-efficacy and media-related factors significantly affect behavior on both platforms, while social influence plays a more prominent role on WeChat and information overload is more salient on Douyin [3]. From the perspective of mobile terminals, factors such as the network environment, social support, objective device conditions, and individual cognition collectively constitute the basic structure underlying older adults' online health information seeking behavior [8].

Second, surrogate searching is an important feature of older adults' digital health information behavior. Due to limitations in operational skills, search abilities, or information evaluation capacities, many older adults rely on their children, relatives, or acquaintances to search for health information on their behalf. Studies focusing on intentions to actively seek surrogate searching, perspectives of surrogate searchers, and review-based research on surrogate searching demonstrate that surrogate searching is not merely a technical compensation mechanism but rather a complex socio-technical behavior embedded in health needs, emotional dependence, self-perception, and information literacy [1,7,26]. This suggests that older adults' digital health information interaction should not be understood solely as a direct interaction between individuals and platforms, but should also incorporate intergenerational support and indirect interaction chains.

Third, continued use behavior reflects the transition from initial exposure to stable and sustained use of digital health information systems. Research indicates that system quality, perceived ease of use, information quality, service quality, and user satisfaction collectively influence older adults' continued use of online health information services [2]. International review studies similarly highlight that social companionship, instrumental support, and individual needs are key factors influencing older adults' use of online health information [27]. Moreover, reviews based on life-cycle theory categorize older adults' online health information behavior into multiple stages, further revealing the continuity and complexity of the behavioral process [9].

Finally, information adoption, evaluation, avoidance, and circumvention behaviors constitute an important extension of research on digital health information behavior. Health information is not automatically adopted once encountered; rather, older adults often go through multiple stages such as trust assessment, emotional response, social comparison, and risk evaluation [11,14]. Particularly in contexts characterized by information overload and conflicting health information, avoidance and circumvention have increasingly emerged as important behavioral outcomes deserving greater scholarly attention [4–6,29].

#### (2) Major Influencing Factors of Older Adults' Digital Health Information Behavior

Based on a synthesis of existing studies, the influencing factors of older adults' digital health information behavior can be broadly categorized into four groups: individual factors, information-related factors, platform-related factors, and social factors.

Regarding individual factors, self-efficacy, health status, health literacy, information literacy, cognitive ability, and emotional state play central roles. Behaviors such as actively seeking surrogate searches for online health information, adopting health information, seeking health information, and avoiding information are all significantly influenced by



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self-efficacy [1,3,7,11]. Cognitive aging, difficulties in information processing, and technology-related anxiety may further increase operational difficulties and psychological burdens [15,17,20].

With respect to information-related factors, information quality, credibility, comprehensibility, relevance, and evidence quality have repeatedly been confirmed as key variables influencing behavioral outcomes. Higher levels of information credibility, relevance, and comprehensibility can significantly reduce older adults' health information avoidance behaviors [6]. In situations involving conflicting health information, evidence quality and source reliability directly influence older adults' information adoption decisions [11]. In short-video health information contexts, presentation formats, visual manipulation, auditory manipulation, and platform scale also serve as important drivers of credibility judgments [10].

In terms of platform-related factors, system quality, service quality, interface design, interaction design, and information overload collectively shape older adults' interaction experiences. Research on continued use indicates that system quality and information quality can influence older adults' online health information use through user satisfaction [2]. Similarly, in the graphical user interface of WeChat, elements such as interface design, information design, system design, and interaction design jointly affect perceived user experience and subsequently influence continuance intention [30]. Conversely, information overload, service overload, and perceived costs may induce anxiety and lead to negative usage behaviors such as avoidance and withdrawal [12,29].

Regarding social factors, intergenerational support, peer relationships, social influence, and digital feedback from younger generations play irreplaceable roles in older adults' digital health information interaction. Older adults often compensate for their lack of information skills through surrogate searching, family assistance, and social support [1,7,26]. Under algorithm-driven recommendation environments, digital feedback from younger family members can significantly reduce information fatigue and suppress health information avoidance [12]. This indicates that older adults' digital health information interaction is not an isolated individual process but is deeply embedded within their social relationships.

### (3) Main Characteristics and Limitations of Existing Research

Overall, research on older adults' digital health information behavior has substantially revealed behavioral types, influencing factors, and several typical mechanisms. In particular, studies focusing on active information seeking, surrogate searching, continued use, and avoidance or circumvention have formed a relatively clear body of knowledge [1,2,4,5,7–9,26]. However, this field remains largely centered on behavioral outcomes, with relatively limited attention paid to interaction processes themselves, such as interface perception, task pathways, feedback mechanisms, cognitive load, and system adaptation issues.

In other words, existing studies are more adept at explaining why older adults search for information, why they use digital health systems, and why they avoid certain information, but provide insufficient answers to questions such as how older adults interact with digital systems and which design factors may alter their behavioral trajectories. This gap underscores the necessity of moving beyond traditional information behavior research toward a stronger focus on human–computer interaction perspectives.

## IV. OLDER ADULTS' HEALTH INFORMATION INTERACTION IN RISK CONTEXTS

### (1) Major Types of Risk Contexts

With social media platforms, short-video applications, and recommendation algorithms increasingly embedded in the daily lives of older adults, their interactions with health information are more frequently occurring within high-risk information environments. Existing studies identify four major types of risk contexts.

The first is the context of conflicting health information. Information conflicts among different platforms, sources, and viewpoints increase the difficulty for older adults to make judgments and adoption decisions. Research indicates that factors such as evidence quality, source reliability, attitude certainty, self-determination, negative emotions, and herd mentality jointly shape the mechanisms through which older adults adopt information in conflicting health information contexts [11].



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The second involves false health information in short-video and live-streaming environments. Older adults are increasingly accessing health information through short-video platforms and live streaming. However, audiovisual manipulation, contextual packaging, and immersive dissemination in short videos often weaken rational judgment. Studies on the credibility evaluation of short-video health information indicate that presentation format, visual manipulation, auditory manipulation, older adults' experiential cognition, and platform scale are key driving factors [10]. Research on live-streaming contexts further shows that platform-level information manipulation can promote older adults' adoption of false health information through mechanisms such as profit-seeking motives, interpersonal bias, and immersive experiences [13].

The third type concerns information overload and avoidance triggered by algorithmic recommendations. Social and health platforms commonly rely on recommendation algorithms to push health content to older users. However, highly similar, frequent, and repetitive content recommendations can easily generate information fatigue, which in turn leads to avoidance behavior. Studies show that the information similarity and overload characteristics of algorithmically recommended content can trigger older adults' health information avoidance through information fatigue, while digital feedback from younger generations can effectively buffer this negative effect [12].

The fourth type involves misleading health information dissemination in acquaintance-based social contexts such as WeChat. Health information on WeChat is characterized by strong everydayness, familiarity, and emotionality. Older adults often encounter such information in a relatively low-alert state. Consequently, factors such as information quality, relevance, comprehensibility, and information overload become important determinants influencing their avoidance behavior [6].

### (2) Behavioral Manifestations in Risk Contexts

Within these risk environments, older adults' health information interaction exhibits a series of representative behavioral patterns.

The first is credibility misjudgment. Older adults often rely on superficial cues, experiential judgment, and platform appearances when evaluating authenticity, making them susceptible to influences such as formal presentation, familiarity, and authority cues [10,13,14].

The second is information adoption bias. In contexts involving conflicting health information, false health information, and short-video health content, older adults may adopt biased information due to factors such as negative emotions, conformity tendencies, profit-seeking motivations, or cultural trust [11,13].

The third is information avoidance and circumvention. Existing research has clearly shown that negative information characteristics, information salience, cognitive dissonance, information overload, anxiety, and channel beliefs may lead older adults to avoid, circumvent, or even withdraw from health information interactions [4–6,12,29].

The fourth is risk-compensatory behavior relying on external support. In high-risk information contexts, learning interventions, social support, participation in library programs or senior university activities, and intergenerational digital feedback can significantly enhance older adults' information discrimination capabilities and risk response capacities [12,14].

### (3) Mechanisms of Risk Interaction

From a mechanistic perspective, older adults' health information interaction in risk contexts is not the result of a single causal factor but rather emerges from the combined influence of information attributes, platform characteristics, individual conditions, and social support.

First, information attributes directly influence older adults' perceptions and judgments. Higher levels of information credibility, evidence quality, comprehensibility, and relevance facilitate rational information adoption. Conversely, when information contains conflicts, exaggeration, ambiguity, or manipulation, it is more likely to induce erroneous adoption or avoidance [6,10,11].

Second, platform logic shapes behavioral outcomes through the interaction environment. The information similarity and overload characteristics of recommendation algorithms can increase information fatigue [12], while perceived costs,



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service overload, and information overload within information platforms may induce anxiety and further lead to avoidance and withdrawal behaviors [29].

Third, individual-level variables such as self-efficacy, attitude certainty, negative emotions, and weak channel beliefs serve as important mediating and moderating factors [4,5,11].

Finally, social support and intergenerational relationships constitute key buffering mechanisms. Research shows that insufficient social support may intensify avoidance behavior, whereas digital feedback from younger generations and learning interventions can enhance information discrimination capabilities and reduce avoidance tendencies [4,12,14].

#### (4) Significance and Limitations of Research on Risk Contexts

Research on risk contexts has shifted the focus of studies on older adults' digital health information from the question of whether older adults use digital health information to deeper questions such as how misjudgments occur, how information is misused, and why avoidance behaviors arise, thereby expanding the scope of health information behavior research [4–6,10–14,29].

However, from the perspective of human–computer interaction, this field still exhibits notable limitations. Most studies emphasize information content, psychological variables, and behavioral outcomes, while relatively limited attention has been paid to design-related aspects such as interface warnings, interaction feedback, task support, and explanatory mechanisms. Moreover, research remains insufficient regarding how interaction design can improve information discrimination abilities, calibrate trust, and reduce cognitive load within risk information environments. These limitations suggest that research on risk contexts should be more closely integrated with age-friendly interaction design in order to develop a research framework with stronger practical implications.

### V. AGE-FRIENDLY INTERACTION IN HEALTH APPS, MOBILE HEALTH, AND SMART HEALTH SYSTEMS

#### (1) Major Problem Domains in Age-Friendly Interaction Research

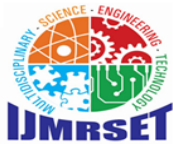
In digital health service scenarios, older adults face not only issues of information accessibility but also challenges related to whether they can successfully operate systems, understand interfaces, complete tasks, and perceive value from their interactions. Consequently, research on age-friendly interaction surrounding health apps, mobile health services, smart health systems, and health management terminals has gradually emerged as an important branch of studies on older adults' digital health information interaction.

This research field mainly focuses on four key issues. The first concerns information design and interface presentation, that is, whether textual content, icons, hierarchical structures, and information organization are suitable for older adults' recognition and comprehension [15,30]. The second involves task design and process complexity, examining whether operational pathways are clear, steps are streamlined, and errors can be easily corrected [17,22]. The third relates to overall user experience and continued use, investigating whether systems can provide experiences that are usable, enjoyable, trustworthy, and controllable [2,18,20,30]. The fourth concerns the balance between value and risk, namely whether systems adequately address older users' privacy concerns and risk perceptions while delivering convenience and health benefits [19,21].

#### (2) Age-Friendly Design in Health Apps and Digital Medical Apps

Current research indicates that age-friendly design in health apps and digital medical apps has gradually evolved from intuitive adjustments such as “larger fonts and bigger buttons” toward more systematic approaches involving user experience evaluation and strategic design frameworks.

On the one hand, studies based on the Human Information Processing (HIP) model have developed a relational framework linking “older adults—HIP—experience barriers—experience design.” This framework proposes an indicator system mapping information design, interface design, and experience barriers. Findings suggest that information design carries the greatest weight in age-friendly experiences, particularly the clarity and recognizability of textual content [15]. This indicates that the primary difficulty older users encounter in digital medical apps is not merely operational complexity but rather comprehension barriers and cognitive load.



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On the other hand, research applying SHERPA (Systematic Human Error Reduction and Prediction Approach) and FMEA (Failure Mode and Effects Analysis) methods to elderly-oriented medical apps decomposes user tasks and analyzes potential failure points. This approach allows designers to identify risk points within operational chains at an early stage and optimize design accordingly [22]. By breaking down the usage process into specific task steps, such methods shift age-friendly design from experience-based judgment toward risk prediction and systematic optimization.

In addition, studies on age-friendly signifiers in health apps show that both the technological characteristics of systems and the cognitive processing patterns of older users jointly influence value realization and subjective well-being [18]. In other words, age-friendly design affects not only whether systems can be used, but also whether users are willing to use them and perceive them as meaningful. Consistent with this finding, a meta-analysis of older adults' willingness to use mobile health services shows that factors such as effort expectancy, performance expectancy, attitude, perceived trust, facilitating conditions, and social influence significantly affect usage intentions [20].

### (3) Interaction Optimization in Smart Health Systems and Online Medical Services

Beyond mobile applications, smart health information service systems, online medical services, and health management terminals have also become important research objects. Research on smart health information service systems driven by multi-source data integration indicates that older adults' health information needs are fragmented and diverse. Therefore, systems should provide intelligent services such as disease diagnosis, prescription recommendations, and health monitoring based on integrated data resources. However, these systems must simultaneously consider older users' service acceptance, interface presentation, and interaction mechanisms [16]. This finding highlights that system-level intelligence does not automatically guarantee age-friendliness; age-friendly interfaces and interaction mechanisms remain critical for system effectiveness.

From the perspective of user value, studies employing the Means-End Chain (MEC) approach show that the value older adults derive from online medical services extends beyond obtaining information or completing tasks. It also involves higher-level psychological values such as a sense of security, belonging, and self-realization [21]. Accordingly, interaction design in online medical platforms should not be limited to functional implementation but should also emphasize real-time communication, emotional support, and relationship building.

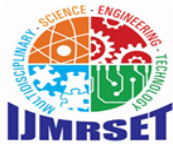
### (4) Interaction Design from the Perspectives of Cognitive Aging and Task Hierarchy

Cognitive aging is one of the central issues in research on age-friendly interaction for older adults. Studies demonstrate that changes in perception, attention, memory, and decision-making processes make older adults more susceptible to operational barriers and cognitive burdens when performing complex health-related tasks [17]. Research applying the SRK (Skill-Rule-Knowledge) framework to multi-level task interaction design in health management terminals reveals that different task levels correspond to different experiential dimensions: skill-based tasks rely more on sensory experiences; rule-based tasks depend more heavily on usability and perceptual support; and knowledge-based tasks additionally require emotional engagement [17]. This finding carries important implications, indicating that age-friendly interaction design should not rely on a single design principle but instead adopt layered design strategies based on task complexity and cognitive demands.

### (5) Privacy, Trust, and Usage Value

As health apps and online medical platforms increasingly expand their data collection capabilities, older users' willingness to disclose personal information and their perceptions of risk have become important topics in interaction research. Studies show that in the context of age-friendly system redesign, factors such as personalization features, procedural fairness, and information control can enhance older users' perceived benefits and promote privacy disclosure. Conversely, information sensitivity and subjective norms tend to increase risk perceptions and inhibit disclosure intentions [19]. These findings suggest that age-friendly design does not imply weakening risk awareness; rather, it requires balancing convenience, benefits, trust, and control.

Overall, research on age-friendly interaction in health apps, mobile health services, and smart health systems has gradually shifted from a narrow focus on usability analysis toward a more comprehensive perspective encompassing experience evaluation, task support, value realization, and risk governance [15–22]. However, current studies still tend to focus on single products or individual systems. Analyses of interaction chains across multiple platforms, cross-context scenarios, and continuous health management tasks remain relatively limited. Moreover, the roles of intelligent



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recommendation, conversational support, and cognitive assistance mechanisms in age-friendly design require further investigation.

### VI. HUMAN-AI INTERACTION AND FUTURE TECHNOLOGICAL SCENARIOS

#### (1) The Shift from Human-Computer Interaction to Human-AI Interaction

With the expanding application of large language models, conversational systems, and intelligent recommendation technologies in health-related contexts, research on older adults' digital health information interaction is increasingly shifting from human-computer interaction (HCI) toward human-AI interaction. In this context, the notion of "intelligence" refers not only to the automation capabilities of technologies but also to their intelligent roles in information organization, content generation, interactive feedback, and decision support. Compared with traditional graphical user interfaces, older adults' health information use under human-AI interaction conditions becomes more dynamic, uncertain, and relational. Consequently, higher requirements are placed on system interpretability, trust calibration, and cognitive support [23–25].

#### (2) Affordances and the Theoretical Advancement of Age-Friendly Design

Within this context, affordance theory provides a higher-level theoretical framework for age-friendly design. Studies on affordance categories and mapping models in age-friendly design for human-AI interaction have identified nine types of affordances, including cognitive affordance, embodied affordance, and empathic affordance, among others. These studies further propose an integrated model linking functional features, affordances, implementation processes, and outcomes [23].

The significance of this framework lies in its elevation of age-friendly design from experience-based interface optimization to a structured mapping process connecting older adults' needs, system functions, and design implementation. In doing so, it offers a more explanatory theoretical foundation for the age-friendly design of health information systems, intelligent wearable devices, and smart health service products.

#### (3) Conversational Systems in Health Services for Older Adults

Conversational systems are expected to become an important medium for future digital health information services for older adults. Systematic reviews indicate that research on conversational systems in age-friendly design has already formed a relatively comprehensive framework centered on driving factors, design paradigms, design elements, and evaluation systems [7].

From the perspective of older users, conversational systems may reduce the operational barriers associated with traditional graphical interfaces by enabling voice interaction, natural language communication, and contextual dialogue, thereby providing lower-burden access to health information services. However, these systems also introduce new challenges, including dialogue comprehension errors, inaccurate recommendations, and the risks of excessive trust and dependence. Therefore, age-friendly design for conversational systems should not be limited to the question of whether dialogue interaction is convenient, but should also carefully consider their interpretability, reliability, and intervention boundaries in health-related contexts [25].

#### (4) Initial Trust Calibration in Large-Model Interaction Scenarios

Trust issues are particularly salient in large-model-based health interaction scenarios. Research on the "tango dance between older adults and large language models" shows that older adults generally exhibit relatively low levels of initial trust in such models. The direction and degree of trust calibration are influenced by factors including older users' needs, their mental models, and system-level design elements such as preset prompts and interaction behaviors [24].

This finding suggests that the relationship between older adults and intelligent systems is not merely a simple use-feedback relationship, but rather a continuous process of trust negotiation and role positioning. For future digital health information systems designed for older adults, the design focus should move beyond simply ensuring usability toward enabling users to understand when a system is trustworthy, when skepticism is necessary, and when external support should be sought.



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### (5) Key Issues in Future Technological Scenarios

Overall, human–AI interaction introduces at least four new issues into research on older adults’ digital health information interaction. First, health information interaction is shifting from static information acquisition to dynamic conversational support, making interactions more continuous and context-dependent [25]. Second, the focus is expanding from interface usability toward cognitive support and decision assistance, requiring systems to help older adults understand, compare, and evaluate health information [23,24]. Third, research is moving from technology acceptance toward trust calibration and risk governance, as system design must prevent excessive trust and blind dependence on intelligent technologies [24]. Fourth, digital health services are evolving from unidirectional service delivery toward human–AI collaboration, requiring algorithms, interfaces, social support mechanisms, and human intervention to be integrated within a unified design framework [23,25].

At present, research on human–AI interaction in the field of older adults’ health information remains at an early stage, yet its importance is becoming increasingly evident. It not only expands the conceptual scope of age-friendly design but also provides a critical entry point for integrating algorithmic risk, trust calibration, and interaction interventions into a unified research framework.

## VII. OVERALL REVIEW: PROGRESS, LIMITATIONS, AND DIRECTIONS FOR INTEGRATION

### (1) Major Research Progress

A review of the existing literature indicates that research on older adults’ digital health information interaction has achieved three major advances.

First, research topics have continued to expand. Studies have gradually extended from traditional information seeking to multiple dimensions such as surrogate searching, continued use, avoidance and circumvention, misinformation adoption, and platform differences, thereby forming a relatively rich body of behavioral research [1–5, 7–9, 26, 28].

Second, research on risk contexts has been increasingly deepened. Scholars have moved beyond examining whether older adults are exposed to digital health information to investigating mechanisms of misjudgment, anxiety, and avoidance in contexts such as conflicting information, short-video platforms, live-streaming environments, and algorithmic recommendation systems [6,10–14,29].

Third, research on age-friendly design and human–computer interaction has gradually emerged. Topics ranging from interface experience, task analysis, and value realization to affordance mapping, conversational systems, and trust calibration in large language models indicate that studies on older adults’ digital health information are evolving from information behavior research toward intelligent interaction research [15–25,30].

### (2) Major Limitations of Existing Research

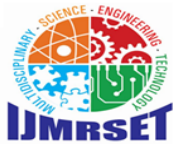
Despite the growing body of research, several significant limitations remain.

First, there is a tendency to emphasize behavioral outcomes while neglecting interaction processes. Many studies effectively explain behavioral outcomes such as seeking, avoidance, and adoption but pay insufficient attention to interface design, feedback mechanisms, task processes, and interaction pathways [1,4–6,9,29].

Second, research tends to focus on isolated factors rather than dynamic processes. Many studies rely on cross-sectional surveys or static analytical models and therefore provide limited insight into dynamic processes such as the transition from initial contact to continued use, or from trust formation to risk defense among older adults [2,20,24].

Third, there is greater emphasis on general platforms rather than intelligent scenarios. Although research on large language models, conversational systems, and smart health systems has begun to emerge, the overall volume remains limited, and systematic discussions of older adults’ health information interaction in generative AI environments are still insufficient [16,23–25].

Fourth, existing studies tend to prioritize usability while overlooking trust and explainability. Current age-friendly design research mainly focuses on usability, user experience, and barrier identification, while issues such as algorithmic



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recommendation, conversational generation, information explainability, and trust calibration have received relatively limited attention [15,17,18,22].

Fifth, research often emphasizes individual factors while neglecting the broader interaction ecosystem. Older adults' digital health information interaction is frequently embedded within intergenerational relationships, platform governance, and social support networks. However, most studies have yet to fully develop collaborative analytical frameworks that integrate the individual–platform–family–community system [7,12,14,26].

### (3) Directions for Future Integration

In light of these limitations, future research may advance along several integrative directions.

First, researchers should develop a comprehensive analytical framework integrating information behavior, interaction experience, risk perception, and behavioral outcomes, thereby linking information behavior research more closely with human–computer interaction studies.

Second, research should shift from a technology acceptance–centered perspective toward one emphasizing cognitive support and trust calibration, particularly in scenarios involving large language models, conversational systems, and algorithmic recommendation technologies.

Third, scholars should strengthen multimodal, cross-platform, and continuous interaction research, examining WeChat, short-video platforms, health apps, online medical platforms, and smart terminals within a unified interaction ecosystem.

Fourth, greater attention should be given to design interventions in risk contexts, exploring how mechanisms such as informational cues, explainable feedback, credibility training, and intergenerational support can collaboratively reduce misjudgment and avoidance.

Fifth, future studies should place greater emphasis on heterogeneity within the older population. Stratified research based on health status, cognitive capacity, platform experience, and levels of social support can improve the precision of age-friendly design and smart health service development.

## VIII. CONCLUSION AND FUTURE PROSPECTS

This study provides a review of research on older adults' digital health information interaction from a human–computer interaction perspective. Existing studies show that older adults' digital health information behaviors mainly include information seeking, surrogate searching, continued use, information adoption, and avoidance. These behaviors are shaped by multiple factors, including individual characteristics, information attributes, platform features, and social support.

In risk contexts such as conflicting health information, short-video misinformation, algorithmic recommendation overload, and health information dissemination within acquaintance-based social networks, older adults are more likely to experience credibility misjudgment, biased adoption, anxiety, and information avoidance. Meanwhile, learning interventions, digital reverse mentoring, and social support can help mitigate these risks.

Research on age-friendly interaction has expanded from basic usability analysis to broader concerns such as user experience, task complexity, value realization, privacy disclosure, and system optimization in health apps, mobile medical services, and smart health systems. At the same time, emerging technologies such as large language models and conversational systems are shifting the research focus toward human–AI interaction, introducing new issues including affordance-based design and trust calibration.

Despite these advances, current studies still emphasize behavioral outcomes while paying limited attention to interaction processes. Future research should strengthen process-oriented analysis, design interventions in risk contexts, interdisciplinary integration, and human–AI collaborative frameworks. In practice, improving older adults' digital health information interaction requires coordinated efforts in interface simplification, information optimization, explainable support, and social collaboration, in order to promote inclusive and effective participation of older adults in the digital health era.



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