How Older Adults Use Digital Technologies for Healthcare? A Systematic Scoping Review

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Abstract

Background: The global trend of population aging is escalating, presenting profound challenges to healthcare systems worldwide. Digital technologies have emerged as pivotal solutions to address these pressing issues. However, the application of digital technologies in healthcare for older adults remains an area that warrants further exploration. This study aims to systematically evaluate the current state of how older adults (55 years and older) utilize digital technology for healthcare, comprehensively analyze its various types, target populations, and impacts, thereby providing a scientific basis for future research endeavors and practical applications.

Methods: This study adheres to the PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews) guidelines. A comprehensive search was conducted across six databases (Web of Science, Scopus, PubMed, IEEE Xplore, ScienceDirect, and APA PsycInfo). A total of 17 articles were ultimately included in the study.

Results: The research findings identified six types of digital technologies applied in older adults' healthcare. Among them, applications for chronic disease management were the most prevalent, followed by those for rehabilitation treatment and health monitoring. These technologies were applied across seven healthcare domains, with chronic disease management, rehabilitation, and health monitoring emerging as the core areas. Regarding the target populations, the studies primarily focused on chronic disease patients, individuals with cognitive impairments, and other vulnerable groups.

Conclusion: This review highlights the potential of digital technologies in meeting the unique needs of older adults. Digital technologies enhance older adults' access to health information, facilitating improved health management. Notable progress has been achieved in areas such as chronic disease management and remote rehabilitation. Future research should prioritize interdisciplinary collaborations to develop aging-friendly digital technologies that can effectively support older adults' healthcare.

Keywords: Older adults, Digital technology, Healthcare, Systematic scoping review

1. Introduction

The trend of global population aging is irreversible. According to the United Nations World Population Prospects 2022 report, the number of individuals aged 65 and older worldwide is projected to rise from 761 million in 2021 to 1.5 billion by 2050 [1]. This increasing old-age dependency ratio places immense pressure on global social welfare systems [2]. As older adults typically experience a higher incidence of health issues, there is a substantial demand for medical services, leading to an increase in expenditures on healthcare for older adults across various countries [3]. Effectively addressing the myriad health challenges associated with aging has become an urgent priority.

The physical functions of older adults gradually decline, leading to a range of complex and specific health needs [4]. Conditions such as hypertension, coronary heart disease, diabetes, and various respiratory diseases are particularly prevalent among older adults [5]. These chronic illnesses not only diminish the quality of life for older adults but also pose serious threats to their overall health and longevity [6]. Chronic diseases lead to a decline in physical functions across multiple systems, including the motor and nervous systems, further impacting their quality of life [7]. Psychological factors such as changes in social roles and environments make older adults more susceptible to mental health issues, including loneliness, depression, and anxiety [8]. These psychological challenges can exacerbate the symptoms of chronic diseases [9]. Alongside these issues, the demand for healthcare knowledge among older adults is increasing. They are becoming more attentive to their health conditions and aspire to prevent diseases and enhance their quality of life through a better understanding of health information [10]. To better understand how older adults utilize digital technologies for healthcare, it is essential to enhance the accessibility, usability, and inclusivity of health information and systems tailored to their specific needs. Older adults often struggle to discern the authenticity and practicality of the information available to them [11, 12]. It is crucial to provide scientific, accurate, and easily comprehensible healthcare knowledge to older adults [13, 14]. This will help them establish correct health concepts and cultivate healthy living habits, which are essential for improving their overall health and well-being [15].

Against the backdrop of addressing global aging and meeting the healthcare needs of older adults, digital technology, with its unique advantages, is gradually emerging as a crucial tool for promoting the healthcare of older adults [16]. Currently, the primary types of digital technologies utilized in older adults' healthcare are as follows: Mobile health (mHealth) applications are essential tools for older adults to access health information and manage their well-being, and their functionalities are becoming increasingly sophisticated [17]. mHealth applications can deliver personalized health information based on factors such as age, gender, and health status [18]. It can provide tailored recipes and recommend suitable exercise methods for older adults [19]. It can also meticulously record and analyze exercise habits, generating personalized exercise reports to enhance their fitness [20]. Wearable devices play a crucial role in the real-time monitoring of the health status of older adults [21]. Smart bracelets, smartwatches, and other wearable technologies can continuously collect a variety of vital sign data, including heart rate, blood pressure, and exercise patterns [22]. Telemedicine technology overcomes geographical barriers and offers more convenient medical services [23]. Through methods such as video calls, online diagnoses, and remote consultations, older adults can

communicate with doctors in real-time from the comfort of their homes, receiving professional medical advice and treatment plans [24].

The Electronic Health Record (EHR) system offers comprehensive and continuous management of health information for older adult patients [25]. It integrates vital information, including the patient's medical history, diagnostic results, test reports, and medication records, into an electronic database that healthcare providers can access and update at any time [26]. This functionality enables doctors to gain a thorough understanding of the health status of older adult patients and to develop more effective treatment plans [27]. Artificial Intelligence (AI)-assisted diagnostic systems can enhance the accuracy of disease diagnosis by analyzing vast amounts of medical images and case data [28]. In the realm of medical image diagnosis, AI systems can swiftly identify lesion characteristics in images such as X-rays, Computed Tomography (CT), and Magnetic Resonance Imaging (MRI), thereby improving both the accuracy and efficiency of diagnoses [29]. Regarding health monitoring, AI algorithms can thoroughly analyze data collected from wearable devices, predict disease risks, and offer personalized preventive measures [30]. Intelligent nursing robots can provide daily care services, such as assistance with eating, bathing, and rehabilitation training, thereby alleviating the caregiving burden on families and society [31]. Big data analysis is crucial in older adults' healthcare. By examining extensive medical records, health monitoring data, and lifestyle behavior data, we can uncover the health needs and behavioral patterns [32]. Digital technology plays an indispensable role in older adults' healthcare by overcoming the time and spatial limitations of traditional healthcare, thereby enhancing the accessibility and efficiency of medical services. By improving the accessibility and usability of digital technologies, we can better enable older adults to access accurate health information and services, ultimately improving their health outcomes.

This study synthesizes and analyzes studies on digital technology applications for older adults' healthcare. While prior reviews have primarily focused on categorizing digital technology types, utilization patterns, and broad health objectives e.g., De Santis et al.'s systematic scoping review [33], which examined health promotion and disease prevention but was limited by a narrow database search 4 databases and included only 7 studies, offering minimal discussion on the roles of diverse technologies [33], or concentrated exclusively on specific technologies (e.g., telemedicine or AI) [34], or generalized challenges and opportunities [35]. This review makes a unique contribution by providing a comprehensive and up-to-date synthesis of recent studies. Specifically, it captures the latest technological advancements amid intensifying global aging challenges, encompasses a broader range of digital technologies with in-depth analysis of their diverse functions, daily health support, risk prevention, rehabilitation enhancement, and social-emotional support, and directly analyzes recent empirical studies to extract detailed insights on study design, technology applications, and effectiveness.

Against the backdrop of the rapid development of digital technology, it is essential to comprehensively summarize the current research status regarding how older adults utilize digital technology for healthcare. This study aims to address the following questions through a systematic scoping review:

(1) What are the temporal trends in research on the use of digital technology for healthcare among older adults?
(2) Which digital technologies are most widely applied in the healthcare of older adults?
(3) In which areas of older adults' healthcare are digital technologies implemented?
(4) What roles do digital technologies hold in the healthcare of older adults?
(5) What are the benefits and challenges faced by older adults in using digital technology for healthcare?

2. Methods

This study employed a systematic scoping review method to explore research findings on older adults utilizing digital technologies for healthcare, with a focus on specific applications of these technologies. The review adhered to the guidelines established by the PRISMA-ScR framework [36], aiming to enhance the methodological quality and credibility of the empirical data obtained and generated [37].

2.1 Search strategy

This study screened relevant papers from six electronic databases: Web of Science, Scopus, PubMed, IEEE Xplore, ScienceDirect, and APA PsycInfo. The search date was May 27, 2025, and the search terms included "older adults", "elderly", "digital technology", and "healthcare", etc. (See Table 1). The PRISMA-ScR checklist is provided in Appendix A.

Table 1. Selected databases and search formats.

Database	Search formula
Web of Science	("older adults" OR "elderly") AND ("digital technology") AND ("healthcare") AND (Publication Years: 2025 or 2024 or 2023 or 2022 or 2021 or 2020) AND (Document Types: Article or Proceeding Paper) AND (Languages: English)
Scopus	TITLE-ABS-KEY("older" AND "adults") OR TITLE-ABS-KEY ("elderly") AND TITLE-ABS-KEY("digital" OR "technology") AND PUBYEAR > 2020 AND PUBYEAR < 2025 AND Article type: Articles AND Languages: English
PubMed	(((elderly[MeSH Terms]) OR (older adults[MeSH Terms])) AND (digital technology[MeSH Terms])) AND (healthcare[MeSH Terms]) AND (Filters: from 2020 - 2025) AND (Full text)
IEEE Xplore	("All Metadata": older adults) OR ("All Metadata": elderly) AND ("All Metadata": digital technology) AND ("All Metadata": healthcare) AND (2020 - 2025)
ScienceDirect	"older adults" OR "elderly" AND "digital technology" AND "healthcare" AND "Years (2020 - 2025)" AND "Article type: Research articles"
APA PsycInfo	"older adults OR elderly AND digital technology AND healthcare" and "Article" and "Year (2020 - 2025)"

2.2 Data selection and extraction

All retrieved records were exported to Zotero software, and duplicate entries were removed. Two independent reviewers (TL and YL) conducted a preliminary screening of the article titles and abstracts based on predetermined inclusion criteria. Any discrepancies between the two reviewers were resolved through consultation with a third reviewer (PP). The inclusion

criteria are as follows: (1) Studies specifically targeting individuals aged 55 and older. While the WHO traditionally defines "older adults" as 65, but recent studies emphasize that age-related health challenges (e.g., cognitive decline, chronic disease management) often emerge earlier, making 55 a critical group for early intervention research [38-40]; (2) Research on digital technologies in the healthcare for older adults; (3) Qualitative, quantitative, or mixed-method research focusing on the application of specific digital technologies in healthcare for older adults. We explicitly excluded non-application-oriented qualitative studies (e.g., purely theoretical frameworks, literature reviews without empirical application, or conceptual discussions of technology design) to prioritize studies that demonstrate real-world use, user experiences, or implementation outcomes. This ensures our synthesis addresses practical, actionable insights for stakeholders; (4) Selected literature published between 2020 and 2025. Given the rapid development of digital technologies, reviewing literature from the past five years will ensure that the research captures current trends and advancements. This timeframe was selected to capture the rapid evolution of digital health technologies and their accelerating integration into geriatric care. Recent studies by Stan et al.[41], confirm that digital health adoption among older adults surged during this period, making it a critical window to review current evidence, identify emerging best practices, and address unresolved challenges in this rapidly advancing field; (5) Research articles; (6) Full-text articles published in English. Interrater reliability revealed substantial to perfect agreement (κ = 0.815-0.838) between two independent reviewers for data selection, data extraction. These criteria are summarized in Table 2.

Table 2. Inclusion and exclusion criteria.

Inclusion Criteria	Exclusion Criteria
A study only for people aged 55 and above	Studies involving people not aged 55 and above
Research on digital technologies for older adults in the field of healthcare	Research on digital technologies for older adults outside the field of healthcare
Qualitative, quantitative, or mixed research methods, and research focusing on the application of specific digital technologies in the field of older adults' healthcare	A explores the views, opinions, and acceptance of digital technology among older adults through qualitative research methods.
Published between 2020 and 2025	Published outside the 2020–2025 range
Research-type articles	Review articles, theses, non-academic publications, book chapters, etc.
Full text in English	Full text in other languages

2.3 Data charting

Based on the review scope methodology guideline provided by the PRISMA-ScR guidelines, the data extraction was developed [36]. After trialing five articles, the table was further adjusted. It includes the following items: author, year, country, type of digital technology,

type of healthcare, target group, role of the digital technology, and its benefits and challenges. All data were extracted by two independent reviewers, and any disagreements during the data extraction process were resolved through consultation with a third reviewer.

To ensure the reliability and validity of the synthesized evidence, all included studies underwent a critical appraisal of their methodological quality. We employed the Mixed Methods Appraisal Tool (MMAT) [42], a validated instrument for assessing the quality of diverse study designs (quantitative, qualitative, and mixed-methods) in systematic and scoping reviews. The MMAT evaluates five criteria: (1) appropriateness of the research question, (2) appropriateness of the study design to address the question, (3) adequacy of data collection methods, (4) consideration of confounding factors or biases or rigor of data analysis, and (5) validity of findings.

2.4 Collating, summarizing, and reporting the results

The research results were collected, summarized, and analyzed using descriptive statistics to describe the characteristics of the sample articles. Descriptive findings were presented through graphs and charts. The results were explained through narrative synthesis to address the research questions raised in the review, and this explanation was verified by all authors.

3. Results

A total of 4512 articles were retrieved through a systematic search, as shown in Figure 1. After deleting duplicate entries using the Zotero software, 3741 articles remained. Two reviewers independently screened the article titles and abstracts, excluding 3569 articles that were not directly related to the research topic, as well as 3 non-English articles. Then, the two reviewers conducted a thorough assessment of the remaining 157 articles. These articles focused on the perspectives, expectations, and attitudes towards digital technologies and health care, rather than specific technological applications. These studies were not the focus of this research, so 140 articles were excluded. The reason for exclusion was that the topic did not match the main focus of this study, which mainly concerned the application of specific digital technologies in the field of older adults' healthcare. Ultimately, 17 articles were determined to be included in this systematic review scope (see Table 3).

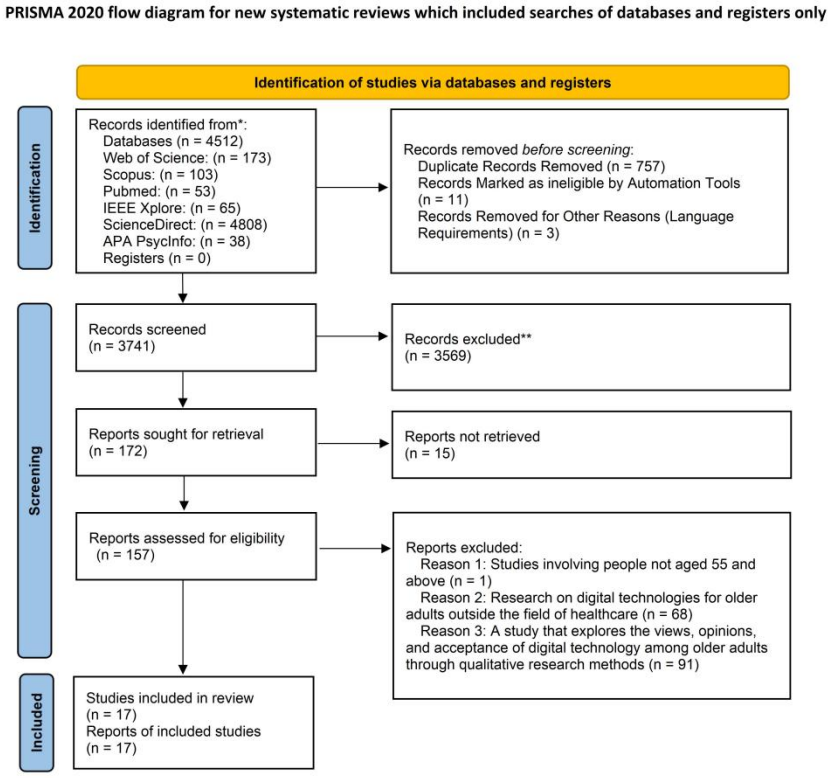

Figure 1. PRISMA flowchart.

Table 3. Overview of Study Characteristics.

Author/ Year/ Country	Study Design	Digital Technology Type	Healthcare Type	Target Population	Significance and Role of Digital Technology	Technical Impact	Benefits	Challenges
Hong et al. 2023 South Korea [43]	Quantitative - Randomized controlled trial	Augmented Reality (AR) glasses	Digital therapeutic exercises	Older adults	Provide non-inferior exercise effects to improve physical and cognitive functions	Improve physical and cognitive functions	Enhance the quality of life	The technical operation is complex and may lead to difficulties in use
HTET et al. 2024 Japan [44]	Quantitative - Experimental study	Stereo depth camera	Activity monitoring	Home-dwelling older adults	Monitors activities and recognizes daily actions for safety and health monitoring	Deep learning and motion information for real-time action recognition	Improved safety and health monitoring for older adults	Privacy concerns and data processing challenges
Al-Somali 2025 Saudi Arabia [45]	Quantitative -Cross-sectional survey	AI Chatbot	Medical information interaction	Older adults	Improve the accessibility and user-friendliness of medical information to support the health management of older adults	Improve the accessibility of medical information	Provide convenient medical information interaction	Technical malfunctions may lead to information loss

Kwak et al. 2020 South Korea [46]	Quantitative -Cross-sectional survey	Mobile Application	Hearing Rehabilitation	Older adults with hearing loss	Provide hearing training and self-assessment tools to improve the effectiveness of hearing rehabilitation	Improve the effect of hearing rehabilitation	Provide personalized listening training	The technology has limited adaptability and may not be suitable for all types of hearing loss
Li et al. 2022 China [47]	Quantitative -Cross-sectional survey	Smartphone Application	Life Satisfaction	Older adults	Enhance life satisfaction through emotional and functional convenience	Improve life satisfaction	Provide emotional support and functional convenience	Low acceptance of technology may lead to insufficient usage
Oostra et al. 2023 Netherlands [48]	Qualitative-Case study	Digital Communication Tool	Care Coordination	Frail older adults	Improve cross-professional communication in primary care and enhance nursing coordination and information sharing	Improve nursing coordination and information sharing	Provide timely nursing support	Difficulties in technical integration may lead to inconsistent information
Khamaj 2025 Saudi Arabia [49]	Mix-Experimental study	AI-Chatbot	Health management	Older adults	Improves the satisfaction with AI chatbots, promotes changes in health behaviors	Improves health behaviors, enhances the quality of life	Provides personalized health support, reduces medical service costs	Data security and privacy issues, differences in technology acceptance

Persson et al. 2020 Sweden [50]	Quantitative - Longitudinal research	Mobile Health Application	Chronic Disease Management	Older adult patients	Provide disease management and health education to improve the effectiveness of chronic disease management	Improve the effectiveness of chronic disease management	Provide personalized disease management	The technical operation is complex and may lead to difficulties in use
Ciubotaru et al. 2023 Romania [51]	Quantitative - Experimental study	Wearable Device	Health Monitoring	Home-dwelling older adults	Monitor health status in real-time	Improve the timeliness of health monitoring	Provide timely health alerts	The technical adaptability is limited and may not be suitable for all health conditions
Choi et al. 2020 South Korea [52]	Mix	Mobile health application	Older adults healthcare	long-term care hospitals/nursing homes	Provides comprehensive care services, including disease management, medication management, and rehabilitation services	Improves the quality and efficiency of care	Improves chronic disease management, reduces drug misuse	High implementation and maintenance costs, data privacy problems

Brunzini et al. 2023 Italy [53]	Quantitative -Algorithm verification study	Decision-support algorithm for Information and Communication Technology (ICT) device	Health monitoring	Older adults	Automatically assigns ICT devices and services according to the health and social needs, preventing acute events and improving the quality of life	Improves the efficiency and accuracy of health monitoring	Early detection of health problems reduces hospitalization rates	Technological complexity and data management problems
Chopvitayakun et al. 2025 Thailand [54]	Mix-Design research study	Mobile Health Application	Nutrition Management	Older adults' post-stroke rehabilitation	Provide nutritional advice and diet tracking, and improve nutritional status	Improve the effectiveness of nutritional management	Provide personalized nutritional advice	High technological dependence may lead to insufficient use
Choi et al. 2022 South Korea [55]	Quantitative -Risk assessment study	Telemedicine Service	Remote medical services	Low-income older adults	Identifies and reduces the risks of telemedicine services, improving service quality	Improves the safety and reliability of telemedicine services	Reduces medical errors, improves patient satisfaction	Low technology acceptance, economic burden
Luo et al. 2024 China [56]	Quantitative -Cross-sectional survey	Social Media Platform	Social Interaction	Older adults during COVID-19	Enhances health information dissemination and	Social media platforms for health information and behavior change	Improved self-rated health and healthier behaviors	Misinformation and over-reliance on digital platforms

					encourages healthier lifestyles			
Frishammar et al. Sweden 2022 [57]	Mix-Cross-sectional survey	Digital health platform	Primary care	Older adult patients	Provides remote healthcare services, improving the accessibility and quality of primary care	Breaks geographical limitations, optimizes medical processes	Older adults can receive medical services more conveniently, timely get a diagnosis and treatment advice	Network instability affects services
Choi et al. 2024 Korea [58]	Quantitative -Cluster randomized controlled study	ICT	Long-term care	Older adults in long-term care hospitals	Provides comprehensive care services, including disease management, medication management, and rehabilitation services	Improves the quality and efficiency of care	Improves chronic disease management, reduces drug misuse	High implementation and maintenance costs, data privacy problems
Zhang et al. 2023 Korea [59]	Mix	Mobile health application	Cognitive training	Patients with Alzheimer's disease	Improve cognitive ability and enhance the quality of life	Provide personalized cognitive training	Enhance the ability to live independently	Technical adaptability, sample limitations

3.1 Characteristics of Studies

The 17 studies included in this research span the period from 2020 to 2025, as illustrated in Figure 2. This figure presents the number of studies published per year, showing a clear upward trend over time. Specifically, there were only two studies each in 2020 and 2021, indicating relatively limited research activity in the initial stages of this field. The number remained stable in 2022 and 2023, with three studies per year, followed by an increase since 2024, four studies were published in 2024, and seven studies had been published by 2025. This upward trajectory may reflect the rapid advancement of digital technology and the growing challenges posed by an aging society, which have collectively drawn increased attention from researchers to the application of digital solutions in older adults' healthcare. The sharp rise in 2025 studies may further stem from multiple factors: the gradual maturation of digital health technologies, e.g., improved technical stability and reliability, enhanced government policy support for digital health integration, and the intensifying social demand for elderly care driven by population aging.

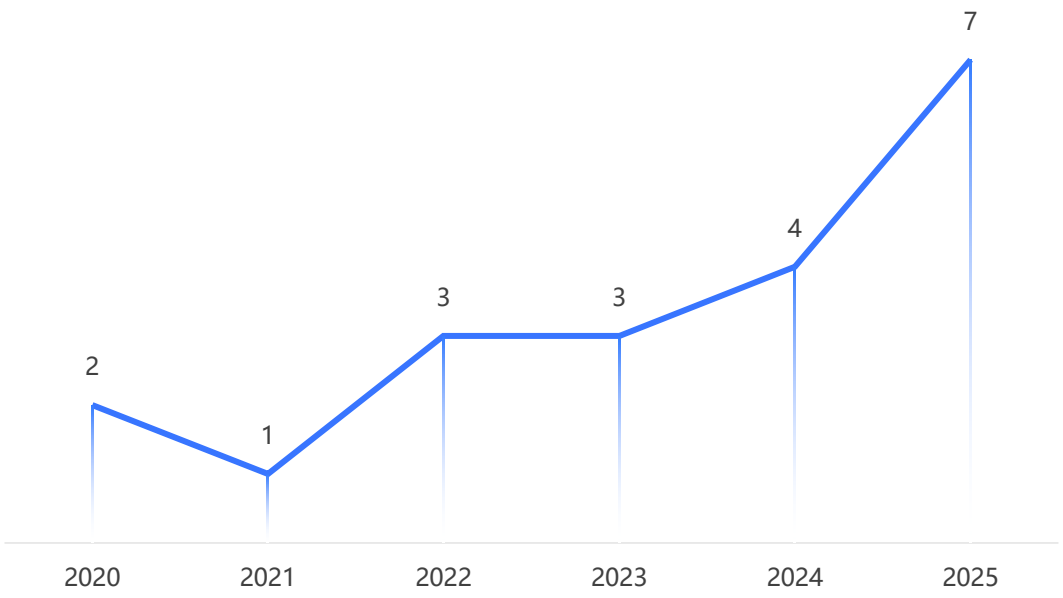

Figure 2. Annual number of publications.

The geographical distribution of the included studies is shown in Figure 3. This figure maps the number of studies conducted across nine countries and regions: Saudi Arabia, South Korea, China, Japan, Sweden, Italy, Thailand, Romania, and the Netherlands. Among these, Saudi Arabia and South Korea exhibited the highest research activity, with four studies each, suggesting strong research capacity and active engagement in this field within these countries. This prominence may be driven by their advanced technical infrastructure and economic resources for digital technology development, as well as the pressing need to address aging-related healthcare challenges. Sweden and China followed closely, each contributing two studies. Sweden, as a highly developed nation, benefits from a well-established healthcare

system and extensive digital technology applications, equipping its researchers with robust capabilities and resources. China has ramped up investment in digital health and aging-related solutions in recent years, fostering increased research activity. The remaining countries, like Japan, Italy, Thailand, Romania, and the Netherlands, each conducted one study. While Japan and Italy face more severe aging pressures, their limited study count may reflect a focus on in-depth exploration of specific technologies or scenarios. In contrast, Thailand, Romania, and the Netherlands, with relatively lower aging levels, may have engaged in research supported by targeted technologies or policies. Nordic countries emphasized user-centered design in their interventions, while Asian studies focused more on family-centered care models. Overall, Asian countries account for a substantial proportion of the research, likely due to the region's rapid demographic aging and emphasis on digital technology innovation.

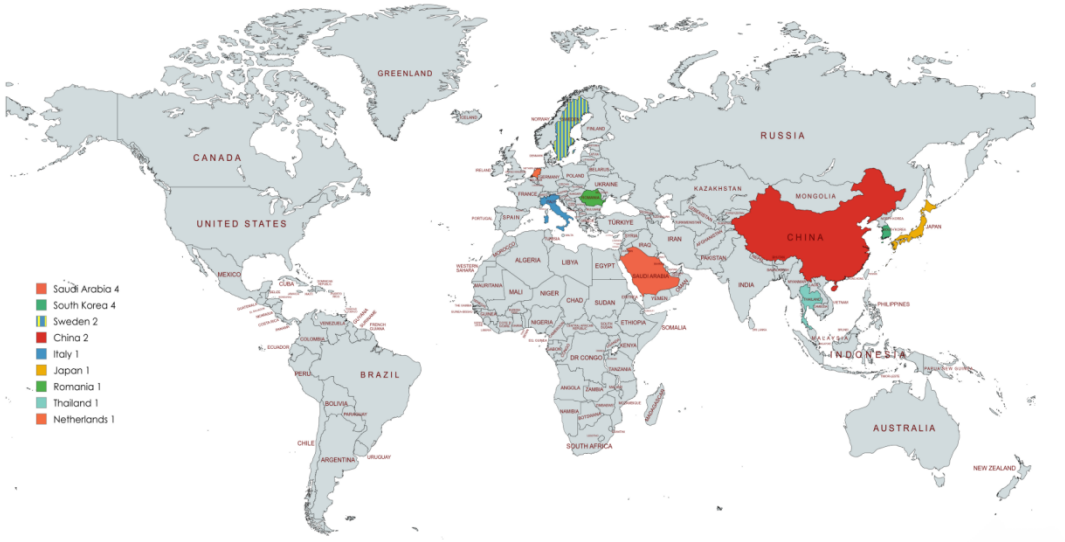

Figure 3. Countries of publication.

3.2 Study Design

From the perspective of the distribution of study design types, the 17 studies cover three main types: quantitative research (11 studies), qualitative research (1 study), and mixed-methods research (5 studies). Among the quantitative research, it can be further subdivided into: randomized controlled trials (1 study), experimental studies (2 studies), cross-sectional surveys (5 studies), longitudinal studies (1 study), algorithm verification studies (1 study), and risk assessment studies (1 study). The randomized controlled trial validates the actual effects of the AR platform through grouping and a controlled design. Experimental studies focus on specific interventions, such as telemedicine and technology testing for groups with low digital literacy. They analyze causal relationships by controlling variables and are often used to verify the effectiveness of technology interventions or the influencing factors of user behavior. The cross-sectional survey is the most frequently used quantitative design. Through questionnaires and electronic records, it mainly describes the current usage status, effects, or problems of digital technologies among older adults. The longitudinal study conducts long-term monitoring of patients using wearable devices to track the dynamic changes of health indicators, which makes

up for the deficiencies of cross-sectional studies. The algorithm verification study and the risk assessment study are quantitative designs for specific purposes. The former verifies the efficacy of AI technologies in the field of older adults' health through preset indicators, while the latter identifies potential risks in technology applications through a quantitative risk scoring system, providing data support for technology optimization and risk management.

There is only one qualitative study, which adopts a case study approach. Through participatory observation or in-depth interviews, it focuses on the subjective experiences of the older adults when using digital technologies and explores non-quantifiable factors that are difficult to capture through quantitative research. The mixed-methods research (5 studies) combines quantitative and qualitative methods, enhancing the comprehensiveness and depth of the research. The experimental mixed methods study combines questionnaires and interviews. The design research mixed methods study uses questionnaires to collect quantitative data on the use of multiple technologies and supplements them. The cross-sectional mixed methods study may combine online surveys and open-ended questions to analyze the influencing factors of older adults' digital health behavior intentions. The risk-assessment mixed methods study takes the Failure Mode and Effects Analysis tool as the core and finally outputs the risk priority and classification.

3.3 Types and Core Features of Digital Technologies

The included literature in this study covers six categories of digital technologies applied, as detailed in Table 4. Among them, mobile applications for health management are the most widely used, involving all four studies. These applications mainly focus on daily life health management, covering functions such as tracking nutrition intake, cognitive ability training, and lifestyle management, demonstrating their core role in improving the quality of life and health management. Remote medical platforms and AI chatbots rank second, with three studies. It improves the accessibility of medical services, especially meeting the needs of older adults with mobility issues. AI chatbots optimize the efficiency of doctor-patient communication. Wearable devices also appeared in three studies, mainly used for real-time health monitoring. These devices can continuously track the vital signs of older adults and issue alerts in emergencies, providing a strong guarantee for daily health safety. AR technology and social interaction platforms were each applied in two studies. It is mainly used for digital exercise training, providing non-inferior exercise effects to improve physical and cognitive functions. Social interaction platforms played a special role during the pandemic, promoting emotional communication and experience sharing among older adults through virtual communities, indirectly improving their mental health status.

Health management applications, which cover multi-dimensional daily intervention functions such as nutrition tracking and cognitive training, are the most widely used in studies aiming to improve basic health conditions. Wearable devices, with their functions of real-time vital signs monitoring and emergency alerts, have demonstrated the effectiveness of immediate support in scenarios of proactive health risk prevention. AR technology focuses on digital exercise training, and its exercise effects and rehabilitation-assisting functions provide preliminary evidence for studies specifically targeting the improvement of physical and

cognitive functions. This distribution indicates that the current research on validating the effectiveness of different digital technologies is characterized by a progression from basic health support to risk prevention and then to functional rehabilitation.

Table 4. Types and Core Features of Digital Technologies.

Types	Application Scenarios	Core Functions	N
Health Management Apps	Daily health support	Nutrition tracking, cognitive training	4
Telemedicine Platforms	Remote healthcare	Online consultations, medication management	3
AI Chatbots	Medical interaction	Automated consultations, health advice	3
Wearable Devices	Health monitoring	Vital signs tracking, emergency alerts	3
AR	Digital rehab	Exercise training, rehabilitation support	2
Social Interaction Platforms	Virtual communities	Emotional support, information sharing	2

3.4 Healthcare Types and Core Functions

The included studies explored seven areas of older adults' healthcare applications, as shown in Table 5. Across these studies, improvements were reported, primarily in metrics such as blood pressure control and mobility. Chronic disease management emerged as the most prevalent, with five studies, which underscores its central role in healthcare. These studies primarily concentrated on the systematic management of chronic conditions such as hypertension and diabetes through digital technology. Key features included disease monitoring, medication reminders, and treatment plan adjustments, all of which enhanced the efficiency and effectiveness of chronic disease management. Rehabilitation therapy with four studies, mainly involving the use of digital technology to assist the older adults in physical function recovery training. These studies provided personalized rehabilitation plans for the older adults through virtual reality, motion tracking, and other technological means, effectively improving their physical abilities and quality of life. Health monitoring with three studies, mainly focusing on real-time monitoring of the older adults' vital signs using wearable devices and smart home technologies. These systems can promptly detect abnormalities and issue warnings, potentially reducing the risk of sudden health incidents. Medical information interaction and improvement of life satisfaction in each two studies. Those studies mainly focused on improving communication efficiency between doctors and patients through mobile applications and remote platforms; life satisfaction improvement studies focused on using digital technology to provide social support and psychological counseling services. Cognitive training and hearing rehabilitation each represent one study. It mainly targeted older adults with mild cognitive impairment, using game-based methods to improve their cognitive functions; hearing rehabilitation focused on providing personalized auditory training programs for older adults with hearing loss. Overall, the application of chronic disease management and rehabilitation therapy was the most widespread, reflecting the current research's focus on improving the

quality of life and functional independence.

Table 5. Healthcare Types and Core Functions.

Healthcare Type	Application Scenarios	Core Functions	N
Chronic Disease Management	Daily chronic care	Disease monitoring, medication & treatment adjustment	5
Rehabilitation Therapy	Physical function recovery	Improve motor ability, quality of life	4
Health Monitoring	Real-time vital signs tracking	Detect abnormalities, reduce risks	3
Medical Information Interaction	Online health consultation	Provide guidance, support decisions	2
Life Satisfaction Enhancement	Social & psychological support	Strengthen connections, improve mental health	2
Cognitive Training	Cognitive function improvement	Prevent decline, enhance thinking	1
Hearing Rehabilitation	Auditory function training	Improve hearing, communication	1

3.5 Target Population

The target population can be classified into six categories: patients with chronic diseases were the main target group in five studies, especially those with chronic diseases such as hypertension and diabetes that require long-term management. These studies focused on improving the efficiency and treatment outcomes of diseases through digital technologies, such as remote monitoring systems and mobile health management applications. Patients with cognitive impairments appeared in four studies, mainly targeting groups with mild cognitive impairment or early dementia. Most of these studies employed cognitive training digital technologies, such as memory games and cognitive assessment applications, aiming to slow down cognitive decline. Patients with hearing loss were involved in two studies, focusing on providing assistive technologies for older adults with hearing impairment. These studies mainly developed hearing rehabilitation applications and intelligent hearing aids to help improve communication ability and quality of life. Older adults with frailty/disability were the target group in three studies, especially those requiring long-term care and rehabilitation. Most of these studies focused on AR technology-supported physical therapy and remote health monitoring systems. Older adults living independently were involved in two studies, mainly targeting those residing in communities with a certain degree of self-care ability. These studies focused on promoting health management and social interaction through mobile applications and social platforms. Older adults in institutional care were involved in two studies, mainly referring to those residing in nursing homes or care institutions. Most of these studies focused on the application of comprehensive care management systems and remote medical platforms. From the results in Table 6, patients with chronic diseases and those with cognitive impairments were the main target groups of digital health technologies, accounting for nearly one-third of

the studies each, reflecting the urgent need for digital health interventions for these two groups.

Table 6. Target Population and Key Characteristics.

Target Population Category	Main Technology Types	N
Chronic Diseases	Chronic Disease Management Apps, Remote Monitoring	5
Cognitive Impairment	Cognitive Training Apps, AR Technology	4
Hearing Loss	Hearing Rehabilitation Apps	2
Frail/Disabled	AR Technology, Remote Monitoring	3
Independently Living	Health Management Apps, Social Platforms	2
Institutionalized Older Adults	Comprehensive Care Systems, Telemedicine	2

4. Discussion

4.1 Main Findings and Results of Studies

The main research findings revealed that the application of digital technologies has shown a diversified trend, mainly concentrating on areas such as chronic disease management, rehabilitation therapy, and health monitoring. Among them, research on chronic disease management accounted for the highest proportion, indicating that digital technologies play an important role in improving the efficiency and effectiveness of chronic disease management. Research on rehabilitation therapy followed closely, demonstrating the potential of digital technologies in improving the physical abilities and quality of life. Research on health monitoring emphasized the critical role of real-time monitoring and warning systems in reducing the risk of sudden health events. It is worth noting that although digital technologies have demonstrated many advantages, most of the studies are still at the stage of functional verification, lacking in-depth research on the long-term integration effect and system compatibility of the technology. The studies mainly focused on solutions for specific health problems, with less consideration of the comprehensive health status.

4.2 Role of Digital Technology

The role of digital technology in older adults' healthcare of adults 55 years and older is becoming increasingly important. Its advantage lies in overcoming traditional time and space limitations, thereby enhancing the accessibility and efficiency of medical services [32]. Specifically, various types of digital technologies play unique and vital roles in older adults' healthcare, improving the quality of life, self-management capabilities, and the standard of medical services. Mobile health applications offering personalized health information and medication reminders improve self-management ability [60]. Mobile applications provide personalized auditory training programs in hearing rehabilitation, improving the hearing

condition [30]. Li et al.'s [47] research reported an association between smartphone application use and improved life satisfaction through providing emotional support and functional convenience. ICT technology provides comprehensive care services in long-term care, including disease management, medication management, and rehabilitation services, significantly improving the effectiveness of chronic disease management and the safety of medication use [58].

Wearable devices offer continuous health data support by monitoring vital signs in real time [22]. Htet et al. [44] indicate that stereo depth cameras combined with AI algorithms excel in activity monitoring, significantly enhancing both safety and the accuracy of health assessments. The research by Hong et al. [43]shows that AR glasses provide non-inferior exercise effects in digital therapy exercises, improving the physical and cognitive functions. By comparing various monitoring technologies, stereo depth cameras paired with AI algorithms can more accurately identify daily activities, promptly detect abnormal situations, and issue warnings, thereby enhancing safety. Ciubotaru et al. [51] also evaluated a prototype of a wearable device system designed for frailty detection by collecting activity data and real-time health monitoring. The system's objective was to alert caregivers to early signs of frailty. Oostra et al.'s [48] research shows that digital communication tools significantly improve the efficiency of care coordination and information sharing in primary care. Choi et al.'s [55] research indicates that remote medical services significantly improve the safety and reliability of care for low-income older adults. Persson et al.'s [50] research shows that mobile health applications provide personalized disease management plans in chronic disease management, significantly improving treatment outcomes. Decision support algorithms improve efficiency and accuracy in health monitoring, enabling early detection of health problems and reducing hospitalization rates [53]. Social interaction platforms played a crucial role during the pandemic by fostering emotional communication and experience sharing through the establishment of virtual communities, which indirectly improved their mental health [61]. Research by Luo et al. [56] indicates that social platforms enhanced the dissemination of health information during the COVID-19 pandemic, promoting healthier lifestyles.

4.3 Technical Impact, Benefits, and Challenges

Digital technology has a profound and multifaceted impact on the healthcare of older adults, significantly enhancing their quality of life and the accessibility of medical services through innovative application models. Health management mobile applications have played a crucial role in improving the self-management capabilities of older adults. Luo et al. [56] indicate that during the COVID-19 pandemic, social platforms not only enhanced the efficiency of health information dissemination but also provided scientific knowledge on epidemic prevention and health guidance. The interactive features within these applications facilitated the sharing of experiences and emotional support among older adults, alleviating feelings of loneliness and anxiety during the pandemic and thereby indirectly improving their mental health status. The application of mobile applications in chronic disease management has also shown significant results. ICT provides comprehensive care services in long-term care, including disease management, medication management, and rehabilitation services [58]. By integrating EHR systems, these applications can track health data in real time [62]. These

technologies can accurately identify the daily actions of older adults and assess their physical condition. Remote medical technology provides convenient medical services for older adults with mobility issues through video calls and online diagnosis, significantly improving the accessibility and efficiency of medical services [63]. It significantly improves the safety and reliability of care for low-income older adults [55]. Especially during the pandemic, remote medical technology effectively reduced the risk of exposure to infection environments, ensuring their health and safety [64].

Although digital technology has demonstrated many advantages in older adults' healthcare, it still faces some challenges that need to be addressed through technological innovation and policy support. The complexity of technical operation may affect the user experience, especially for those with low technological acceptance [65]. The initial setup and maintenance of the equipment also require professional guidance, increasing the usage threshold [66]. Data privacy and security issues cannot be ignored, especially in applications involving personal health information [66]. Khamaj's research emphasized that AI chatbots, while providing personalized health support, may face the risk of data leakage [49]. AI chatbots need to collect and analyze health data to provide personalized advice and services, but if this data is illegally obtained or abused, it will pose a threat to privacy and security [67]. Low technological acceptance may lead to insufficient usage rates of digital technology, while economic burden limits the use of low-income older adults [55]. Some older adults are skeptical of new technologies, considering them complex and unreliable, and thus are unwilling to try using them [68]. The cost of digital devices and services may also impose economic pressure on low-income older adults, limiting their access to digital health services [69]. Although digital technology performed well in the functional verification stage, its long-term integration effect and system compatibility still require further research. Policy and regulatory support is also important factor in promoting the popularization of digital technology.

4.4 Implications for Policymakers and Future Directions

Policy development needs to address both immediate implementation barriers and long-term sustainability. Regulatory bodies must establish comprehensive frameworks that go beyond basic data privacy protections. This includes mandating standardized data interfaces across all digital health devices to ensure seamless integration with electronic health records and hospital information systems. Algorithm governance policies should require transparent decision-making processes in AI-driven health tools. Funding mechanisms need to prioritize scalable solutions that have demonstrated measurable impact in real-world settings.

The economic implications of digital health adoption warrant targeted policy interventions. Public funding models should incorporate technology access subsidies for low-income older adults, recognizing that cost remains a significant barrier to adoption even when tools are clinically effective. Workforce development policies should expand training programs for healthcare professionals in digital tool utilization and interpretation, while also addressing the need for community-based technical support services that assist older adults in overcoming usability challenges. Governments and relevant institutions should provide corresponding funds and policy support to reduce the economic burden, while formulating data privacy

protection regulations to ensure the security and legality of health data. Future research should focus on user-friendly technology design, mechanisms for protecting data privacy, evaluations of long-term integration effects, and the development of supportive policies and economic frameworks to promote the sustainable advancement of digital technology in older adults' healthcare.

In conclusion, the application of digital technology in older adults' healthcare has a profound impact and offers significant benefits. However, it must overcome challenges such as the complexity of technical operations, data privacy and security concerns, acceptance of technology, and economic burdens to achieve comprehensive promotion and long-term application.

4.5 Limitations

This study has several limitations regarding the exploration of digital technologies utilized by older adults for healthcare. Firstly, the scale and diversity of the research sample are restricted. Only 17 pieces of literature were included, as our inclusion criteria focused specifically on empirical studies published between 2020-2025 that directly examined the application of digital technologies in older adult healthcare, excluding non-application-oriented qualitative research and reviews. This targeted selection, while ensuring relevance, reduced the overall sample size. One limitation of this scoping review is the selection of only English full-text articles. This exclusion criterion means that important research published in other languages, particularly those from rapidly aging non-English speaking regions, may have been omitted.

Additionally, the regional representation of the included studies showed a significant bias toward Asia and the Middle East, potentially limiting the generalizability of findings to other global contexts. Secondly, the current focus is relatively narrow, with most studies concentrating on a single health issue, thereby lacking a comprehensive consideration of the overall health status. This oversight neglects key factors such as mental health and social isolation, which have a synergistic impact on health outcomes. Furthermore, the included studies show preliminary value of digital technologies for older adults, but current evidence mainly focuses on implementation feasibility (e.g., user acceptance, ease of use, system stability) rather than proven clinical or behavioral outcomes. Most studies, based on small samples or short-term observations, report technical functionality or user satisfaction, lacking rigorous clinical metrics or evidence of sustained behavior change. Future research should conduct larger, long-term randomized trials to assess true clinical impacts and behavioral sustainability.

5. Conclusion

Our systematic literature review contributes to reiterating the role of digital technologies for improving health conditions and accessing health information, particularly in core areas such as chronic disease management, rehabilitation treatment, and health monitoring. However, despite substantial research found in existing literature, solutions are limited to specific health problems and lack a comprehensive consideration of the overall health status. Our findings also

highlight actionable pathways for healthcare providers and policymakers to integrate digital health tools into the routine care of adults 55 years and older. Policymakers are urged to establish regulatory frameworks that address data privacy, standardize interoperability across devices, and incentivize the adoption of user-friendly designs to mitigate barriers related to digital literacy. Future research should continue to deepen the assessment of the application outcomes and the long-term impact of digital technologies, explore more inclusive and sustainable technological solutions, and comprehensively enhance the quality of life and health of older adults.

Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Availability of data and materials

The data used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare no competing interests.

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Authors' contributions

T.L. and Y.L. proposed the idea to conceive and design this study. Y.L. analyzed the data. T.L. completed the manuscript with the assistance of Y.L. P.P. supervised students and oversaw this work. All authors discussed the results and contributed to the final manuscript.

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