

# BMJ Open Exploring the role of health applications in promoting health among older adults: a scoping review protocol

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## ABSTRACT

**Introduction** Evidence on the use of health apps to support healthcare and promote the health of individuals aged 55 and older is limited. Older adults face challenges with literacy, usability and accessibility of digital tools. This scoping review aims to explore how digital health apps promote healthy living and self-empowerment while identifying successful applications for older adults

**Methods and analysis** This study will adopt the JBI methodology for scoping reviews, guided by the (Population, Concept, Context) framework. The results will be comprehensively reported in the final scoping review and illustrated using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews. The inclusion criteria include studies from 2016 to 2024 that investigate the use of health applications within healthcare services for older adults.

**Ethics and dissemination** Ethical approval is not required for this scoping review. The findings will highlight potential directions for future research and improve knowledge among professionals, researchers and the public. The results will be published in a peer-reviewed journal and disseminated through professional networks. Data will be available from the Open Science Framework.

## STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ Focusing on the 55+ age group targets a key gap in digital health research, highlighting their distinct needs and barriers to using health technology.
- ⇒ The results will guide healthcare providers, policy-makers and app developers in enhancing digital health services for older adults.
- ⇒ Variations in health apps and their use across healthcare settings complicate the synthesis of data and conclusions.
- ⇒ The review's general approach to health apps will not focus on solutions for specific health problems in older adults.

## INTRODUCTION

According to the WHO, a person is considered an older adult when they reach 65 or older. However, the definition of older adults can vary between diverse cultures and social contexts. This criterion is based on a convention that has historical roots and is widely used in many countries to define the retirement/retirement age and other benefits related to senility.<sup>1</sup> The demographic transition has led to a major global health achievement with increased healthy life expectancy in many countries. This shift has resulted in a growing population of individuals over 55 who continue to contribute significantly to the workforce and production chain.<sup>2-4</sup> These older workers are of particular interest as they navigate the transition to retirement requiring tailored health interventions.

Understanding how digital health applications support this population promoting well-being and self-empowerment is central. In gerontology and public health, the concept of older adults has been affirmed as the phase of life that follows middle adulthood but precedes old age traditionally associated with dependence.<sup>5</sup> One of the inherent characteristics of the life cycle of older adults is age-specific literacy, which developers should include in digital tools, specifically applications, designed to promote their health.<sup>6</sup> Research published by Nature indicates a general lack of evidence for health applications for two reasons: a small percentage has been investigated and the evidence tends to be of low quality for those that have been analysed.<sup>7</sup> This underscores the importance of investigating how health applications are being used to promote health specifically for this group, during a critical phase of their life cycle, where maintaining autonomy and well-being is essential.

For the purposes of this review, we have adopted the age of 55 and older to investigate whether digital health apps promote healthy living and self-empowerment among individuals and households approaching retirement,



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while also exploring successful experiences in the use of such apps for this age group.

### Review question

The aim of this scoping review is to map the range of health applications used to promote healthy living and self-empowerment among older adults (aged 55+). It addresses the following main question: What health apps are being used in healthcare services for older adults and how do they contribute to the health promotion and empowerment of this population?

## MATERIALS AND METHODS

The proposed scoping review will be conducted in accordance with the JBI methodology for scoping reviews, considering the PCC framework, where P stands for 'Participants', C for 'Concept' and C for 'Context'.<sup>8</sup> The Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA)<sup>9</sup> will be used as a guide to report the results of this study. A scoping review will be conducted rather than a systematic review due to the broad nature of the research question, which is not aimed at determining the effectiveness or effects of a specific intervention. The start date for the protocol and search strategy was 15 January 2024, and the expected publication date of the scoping review is March 2025.

### Inclusion criteria

#### Participants

This scoping review will consider studies that include older adults (55+ years).

#### Concept

This review will examine the concept of 'health apps' specifically focusing on studies that describe the applications for mobile phones and tablets adopted in healthcare services in the public health sector.

Studies will be excluded if they describe applications that are not aimed at health promotion, focusing only on clinical disease treatment.

### Context

This review will consider studies published between 2016 and 2024 that examine the use of mobile health applications in promoting healthy living and supporting health empowerment among older adults, particularly in primary healthcare settings. The selected period, covering 4 years before and after the COVID-19 pandemic, is based on an interest in assessing how the pandemic may have influenced the adoption and development of these technologies. 31 December 2019, the date when the WHO received the first official notification of the coronavirus outbreak, marks a key milestone. By comparing studies from both periods, it will be possible to explore whether the pandemic accelerated the use of health apps among older populations.

### Inclusion criteria

This scoping review will consider experimental and quasi-experimental study designs, analytical observational studies and descriptive observational study designs. Qualitative and mixed-method studies will also be included. Additionally, secondary studies discussion papers, and policy documents pertinent to the review questions and meeting the inclusion criteria will be evaluated for inclusion. Letters, editorials, protocols and systematic reviews will be excluded. The search strategy will aim to locate both published and unpublished primary studies, policies and opinion papers.

An initial limited search in EMBASE (Elsevier) and MEDLINE (PubMed) was carried out to identify articles on the topic of interest.

With the support of an expert librarian, the primary author used key terms contained in the titles and abstracts of relevant and associated index terms to develop a complete search strategy for EMBASE (table 1) and MEDLINE (table 2).

The search strategy, including all identified keywords and index terms, will be adapted for each database consulted. Furthermore, the reference lists of all included studies will be screened for any additional relevant

**Table 1** Search strategy for EMBASE (Elsevier) conducted on 31 January 2024

Search	Query
#1	'elderly care'/exp OR 'elderly care':ab,ti OR 'Health of the Elderly':ab,ti OR 'Old Age Assistance':ab,ti OR 'Health Services for the Aged':ab,ti OR 'very elderly'/exp OR 'Aged 80 and over':ab,ti OR 'aged 80 and over':ab,ti OR 'aged'/exp OR 'aged':ab,ti OR 'elderly adults':ab,ti
#2	'Internet'/exp OR 'Internet':ab,ti OR 'internet use'/exp OR 'internet use':ab,ti OR 'Dashboard Systems':ab,ti OR 'plataform':ab,ti OR 'platform':ab,ti OR 'online platform':ab,ti OR 'digital platforms':ab,ti OR 'digital media'/exp OR 'digital media':ab,ti OR 'digital health':ab,ti OR 'artificial general intelligence'/exp OR 'artificial general intelligence':ab,ti OR 'artificial intelligence software'/exp OR 'artificial intelligence software':ab,ti
#3	'mental health'/exp OR 'mental health':ab,ti OR 'mental health service'/exp OR 'mental health service':ab,ti OR 'Mental health teletherapy':ab,ti OR 'follow up'/exp OR 'follow up':ab,ti
#4	'retirement'/exp OR 'retirement':ab,ti OR 'retired':ab,ti OR 'pensioner'/exp OR 'pensioner':ab,ti OR 'retire':ab,ti
#5	#1 AND #2 AND #3 AND #4
Date limit: 2016–2024. Results: 56.	

**Table 2** Search strategy for MEDLINE (PubMed) conducted on 31 January 2024

Search	Query
#1	"Health of the Elderly"(Title/Abstract)OR "Old Age Assistance"(Title/Abstract)OR "Old Age Assistance"(MeSH Terms) OR "Health Services for the Aged"(Title/Abstract)OR "Health Services for the Aged"(MeSH Terms) OR "Aged 80 and over"(Title/Abstract)OR "aged, 80 and over"(MeSH Terms) OR "Aged"(Title/Abstract)OR "Aged"(MeSH Terms) OR "elderly adults"(Title/Abstract)OR "Middle Aged"(Title/Abstract)OR "Middle Aged"(MeSH Terms)
#2	"Internet"(Title/Abstract)OR "Internet"(MeSH Terms) OR "Internet use"(Title/Abstract)OR "Internet use"(MeSH Terms) OR "Dashboard Systems"(Title/Abstract)OR "Dashboard Systems"(MeSH Terms) OR "platform"(Title/Abstract)OR "platform"(Title/Abstract)OR "online platform"(Title/Abstract)OR "digital platforms"(Title/Abstract)OR "digital media"(Title/Abstract)OR "digital health"(Title/Abstract)OR "digital health"(MeSH Terms) OR "Artificial Intelligence"(Title/Abstract)OR "Artificial Intelligence"(MeSH Terms)
#3	"Mental health"(MeSH Terms) OR "Mental health"(Title/Abstract)OR "Mental health services"(MeSH Terms) OR "Mental health services"(Title/Abstract)OR "Mental health teletherapy"(MeSH Terms) OR "Follow-up"(Title/Abstract)
#4	"Retirement"(Title/Abstract)OR "Retirement"(MeSH Terms) OR "retired"(Title/Abstract)OR "retire"(Title/Abstract)
#5	#1 AND #2 AND #3 AND #4
Date limit: 2016–2024. Results: 49.	

papers. Articles in English, Portuguese and Spanish will be included. Sources of unpublished and grey literature to be searched include Web of Science (table 3) and Scopus (table 4), Thesaurus and Prospero, as well as government and non-governmental documents such as country reports, policies and regulations related to this topic.

### Study selection and screening

Following the search, all identified citations will be uploaded to Rayyan (<http://rayyan.qcri.org>) and duplicated removed. Following a pilot test, the titles and abstracts will then be screened by two independent reviewers for the evaluation of the inclusion criteria for the review (MTL and MS-M). Potentially relevant papers will be retrieved in full, and their citation details will be imported into Rayyan. The full text of the selected citations will be evaluated in detail against the inclusion criteria by two independent reviewers (HL and ABS). Reasons for exclusion of full-text articles that do not meet

the inclusion criteria will be recorded and reported in the scoping review.

Any disagreement that arises between the reviewers at each stage of the selection process will be resolved through discussion or with a third reviewer. The results of the search will be fully reported in the final scoping review and presented in a PRISMA diagram<sup>10</sup>

Data will be extracted from articles included in the scoping review by two independent reviewers using a data extraction tool adapted from the Joanne Briggs Institute (JBI) framework data extraction instrument.<sup>11 12</sup> The data extracted will include specific details on the participants, concept, context, the study methods and key findings relevant to the questions. A draft extraction tool is provided in table 5.

The draft data extraction tool will be modified and revised as necessary during the process of extracting data from each included paper. Changes will be enhanced in the review. Any disagreement that arises between

**Table 3** Search strategy for Web of Science conducted on 31 January 2024

Search	Query
#1	TS="Health of the Elderly" OR KP="Old Age Assistance" OR TS="Old Age Assistance" OR TS="Health Services for the Aged" OR TS="Aged 80 and over" OR KP="Aged" OR TS="Aged" OR KP="elderly adults" OR TS="elderly adults" OR KP="Middle Aged" OR TS="Middle Aged"
#2	KP="Internet" OR TS="Internet" OR KP="Internet use" OR TS="Internet use" OR TS="Dashboard Systems" OR KP="platform" OR TS="platform" OR KP="platform" OR TS="platform" OR KP="online platform" OR TS="online platform" OR KP="digital platforms" OR TS="digital platforms" OR KP="digital media" OR TS="digital media" OR KP="digital health" OR TS="digital health" OR KP="Artificial Intelligence" OR TS="Artificial Intelligence" OR TS="artificial general intelligence" OR TS="artificial intelligence software"
#3	KP="mental health" OR TS="mental health" OR KP="mental health service" OR TS="mental health service" OR TS="Mental health teletherapy" OR KP="follow-up" OR TS="follow-up"
#4	KP="retirement" OR TS="retirement" OR KP="retired" OR TS="retired" OR TS="pensioner" OR KP="retire" OR TS="retire"
#5	#1 AND #2 AND #3 AND #4
Date limit: 2016–2024. Results: 34.	

**Table 4** Search strategy for Scopus conducted on 31 January 2024

Search	Query
#1	TITLE-ABS-KEY ("Health of the Elderly" OR "Old Age Assistance" OR "Old Age Assistance" OR "Health Services for the Aged" OR "Aged 80 and over" OR "Aged" OR "elderly adults" OR "Middle Aged")
#2	TITLE-ABS-KEY ("Internet" OR "Internet use" OR "Dashboard Systems" OR "platform" OR "platform" OR "online platform" OR "digital platforms" OR "digital media" OR "digital health" OR "Artificial Intelligence" OR "artificial general intelligence" OR "artificial intelligence software")
#3	TITLE-ABS-KEY ("mental health" OR "mental health service" OR "Mental health teletherapy" OR "follow up")
#4	TITLE-ABS-KEY ("retirement" OR "retired" OR "pensioner" OR "retire")
#5	#1 AND #2 AND #3 AND #4 AND #5
Date limit: 2016–2024. Results: 73.	

the reviewers will be resolved through discussion or with a third research member. Authors of articles will be contacted to request missing or additional data, if necessary.

### Data analysis and presentation

The search process will be presented, along with the study flow diagram. Data supporting the review question will be analysed and presented in tabulated form using charting techniques. Furthermore, descriptive frequencies, word count and content analysis will be presented to show how the findings relate to the aim of the review.

For the presentation of the tag 'health apps for older adults', a word cloud will be generated. Any gaps in the data will be highlighted so that future researchers can focus on those.

A preliminary analysis of 102 articles was conducted using VOSviewer V.1.6.20 software<sup>13</sup> to assess the accuracy of the search strategy (figure 1). Since VOSviewer is primarily designed for the analysis of bibliometric networks, its text-mining capabilities were employed to construct co-occurrence networks of key terms extracted from the retrieved literature. Word co-occurrence refers to the simultaneous appearance of two or more words within the same context. These co-occurrence networks, derived from the set of retrieved articles, provide a synthesised overview of the main topics addressed. By examining these graphical networks, it is possible to evaluate whether the search strategies effectively identify articles relevant to the research question.

The network reveals two distinct groups of words, identified by different colours, with the term 'person'

positioned at the centre of the graphic and connected to other terms. The size of the spheres corresponds to the frequency of word occurrences, with larger spheres indicating more frequent terms. Words associated with investigation and observational studies, such as 'respondent', 'participant', 'intervention' and 'association', are represented by larger spheres. The numerous connections stemming from 'education' and 'internet use' suggest these topics are prevalent across several retrieved studies. Careful consideration will be given to studies from China to avoid bias, as the review aims to present a broad range of experiences across various regions and countries

### Patient and public involvement

Patients and the public were not involved in the design, conduct or reporting of the scoping review on health applications for older adults.

However, they will play a crucial role in disseminating the findings. Our dissemination plan is designed to ensure that the results of our review are accessible not only to healthcare professionals and researchers but also to older adults and the wider community, who stand to benefit the most from the advancements in health applications.

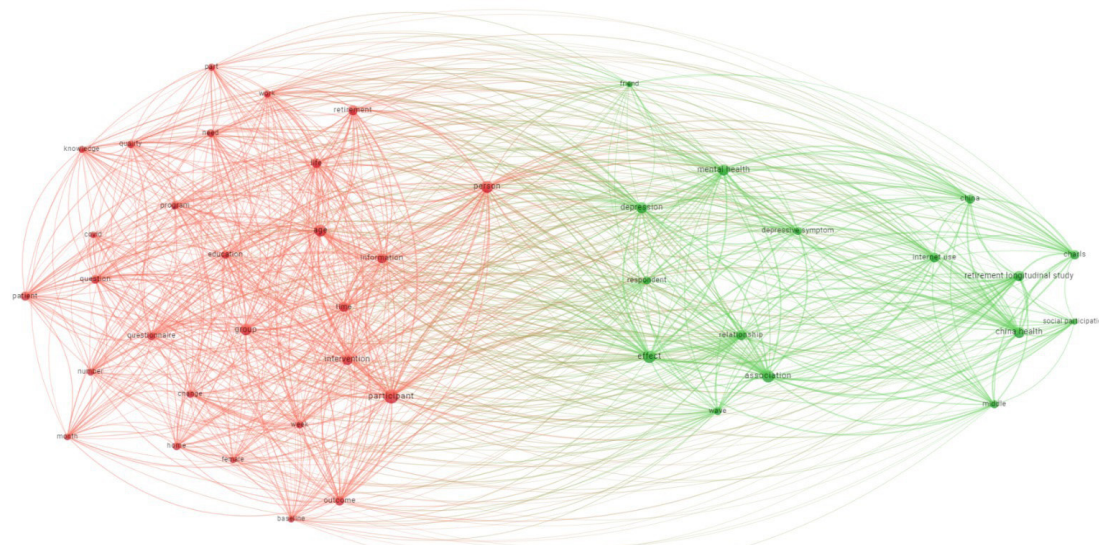
### ETHICS AND DISSEMINATION

Ethical approval is not required for this scoping review. The findings will highlight potential directions for future research and improve knowledge among professionals, researchers and the public. With this scoping review, the authors expect to offer a mapping of best practices evolving apps to older adults in health promotion

**Table 5** Data extraction instrument

Study details	Inclusion/exclusion criteria	Evidence source details and characteristics	Results extracted from source of evidence (in relation to the concept of scoping review)
Study title:	Population	Citation details (author/s, date, title, journal, volume, issue, pages)	Participants (age/sex and total number)
Objective/s:	Concept	Country	Type of health apps
Principal question/s:	Context	Concept	Caring activities provided (health promotion, illness prevention, treatment, rehabilitation)
	Types of evidence source	Context	Details of validation instrument of the app





**Figure 1** Snapshot of bibliometric network of the scoping review data. Source: [https://app.vosviewer.com/?json=https%3A%2F%2Fdrive.google.com%2Fuc%3Fid%3D1NdBDmJFFalfOKII9Pp1jIQJybx\\_I6lIV](https://app.vosviewer.com/?json=https%3A%2F%2Fdrive.google.com%2Fuc%3Fid%3D1NdBDmJFFalfOKII9Pp1jIQJybx_I6lIV).

empowerment. Furthermore, the intended mapping of health apps will allow divergences and/or common aspects to emerge among countries around the world.

The dissemination strategy includes publishing in peer-reviewed journals and presenting at both academic and non-academic venues to ensure wide accessibility. This approach aims to bridge research and practice, enhancing the impact of findings on older adults' health and quality of life by informing and empowering the broader community. Future research phases will continue exploring ways to involve patients and the public, aligning with their perspectives and needs.

The results will be published in a peer-reviewed journal and disseminated through professional networks. Data will be available from the Open Science Framework (OSF).

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**Contributors** The undersigned authors certify that they have made substantial intellectual contributions to the preparation of this systematic review protocol by participating in its conception and design, drafting and critically reviewing the content for important intellectual considerations and giving final approval of the version to be published. Furthermore, ABS and HL took the lead in conceiving the study and provided specialised expertise on the systematic review methodology.

SRFS was responsible for the definition of the search strategy including all identified keywords and index terms. MTL and MS-M have significantly contributed to refining the review's scope and methodology, ensuring a rigorous approach to the forthcoming research. All authors agree to be accountable for the work, ensuring the accuracy and integrity of the protocol and addressing any questions related to it appropriately. ABS is responsible for the overall content as guarantor. AI was used for translation purpose.

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**Competing interests** None declared.

**Patient and public involvement** Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further details.

**Patient consent for publication** Not applicable.

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