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Willingness, perceived barriers and motivators in adopting mobile applications for health-related interventions among older adults: a scoping review protocol

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ABSTRACT

Introduction The world's older population continues to grow at an unprecedented rate. An ageing population poses a great challenge to our healthcare system that requires new tool to tackle the complexity of health services as well as the increasing expenses. Mobile health applications (mHealth app) is seen to have the potential to address these challenges, alleviating burdens on the healthcare system and enhance the quality of life for older adults. Despite the numerous benefits of mHealth apps, relatively little is known about whether older adults perceive that these apps confer such benefits. Their perspectives towards the use of mobile applications for health-related purposes have also been little studied. Therefore, in this paper, we outline our scoping review protocol to systematically review literature specific to older adults' willingness, perceived barriers and motivators towards the use of mobile applications to monitor and manage their health.

Methods and analysis Arksey and O'Malley's scoping review methodology framework will guide the conduct of this scoping review. The search strategy will involve electronic databases including PubMed, Excerpta Medica Database, Cumulative Index of Nursing and Allied Health Literature, Cochrane Library, Google Scholar and ScienceDirect, in addition to grey literature sources and hand-searching of reference lists. Two reviewers will independently screen all abstracts and full-text studies for inclusion. Data will be charted and sorted through an iterative process by the research team. The extracted data will undergo a descriptive analysis and simple quantitative analysis will be conducted using descriptive statistics. Engagement with relevant stakeholders will be carried out to gain more insights into our data from different perspectives.

Ethics and dissemination Since the data used are from publicly available sources, this study does not require ethical approval. Results will be disseminated through academic journals, conferences and seminars. We anticipate that our findings will aid technology developers and health professionals working in the area of ageing and rehabilitation.

Strengths and limitations of this study

► This scoping review will capture current issues and opportunities related to technology-enabled mobile applications among older adults.
► Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Review tool will be used to ensure a systematic approach to searching, screening, charting, collating, reporting and stakeholders consultation.
► The search strategy is comprehensive and includes both peer-reviewed literature (electronic bibliographic databases) and grey literature.
► Despite the strength, this scoping review only considers studies written in English where large number of studies in other languages will be missed out.
► As this is a scoping review, critical appraisal of the study quality and the risk of bias will not be undertaken.

INTRODUCTION

The world's older population continues to grow at a rapid pace. Today, there are 703 million people aged 65 years or over in the world.[1] This number is projected to double to 1.5 billion in 2050 with the proportion of one in six people in the world will be aged 65 years or over.[1] In the case of Malaysia's population, this subpopulation has increased gradually since the 1970s and expected to be tripled from 2.0 million today to more than 6.0 million by 2040.[2 3] This phenomenon represents one of the remarkable achievement of mankind history with respect to health, social and economic improvements over time.[1] The improvements in healthcare system such as infections control, immunisations and better access in healthcare are among the huge contributors to the sustained increases in life expectancy across the globe.[4–6]

However, this success history of human life expectancy did not come with a proportionate increase in quality of life for older adults. As heavily discussed in the literature, increased life expectancy has increased the risk in developing chronic diseases, disability and dementia prior to death.[7][8] This explains a higher use of health services and greater demand for specialised services among the elderly.[9–11] Consequently, this puts increasing pressure on the economy and social systems in most countries due to the complexity of health services required along with increased health expenditure.[12–14]

Technological innovations have enabled us to carry out tasks effectively and efficiently. The field of technology-supported healthcare is remarkably growing and provide new ways of self-management and support. Although older adults may be seen as technological laggards, the internet usage among this subpopulation has been reported to increase from year to year.[15] For instance, in the UK, the internet usage among older adults aged 65–74 group has increased gradually over the last 8 years, with 52% in 2011 to 83% in 2019.[16] To add, the trend of smartphone ownership reported to grow rapidly across the globe.[17]

This rapid growth of technology, particularly in smartphones and internet use, has led to a surge of interest in using mobile applications as a tool to seek health information as well as to monitor and manage health (commonly known as mobile health or mHealth).[18–20] mHealh is defined as 'medical and public health practice supported by mobile devices, personal digital assistants and other wireless devices'.[21] There are more than 325 000 identified mHealth applications covering diverse of health, fitness and medical topics.[22][23] There is clear evidence that mHealth applications is effective in improving self-care, self-management, self-efficacy, medication adherence as well as in improving health behaviours such as quality of sleep, diet, physical activity and mental health.[24] In particular to older adults population, there are a number of studies demonstrating the benefits of mHealth towards older adults.[25–29] This includes, it can help to address existing barriers to treatment such as long waiting time at hospital, poor access to transportation and increased cost of healthcare services.[25–29]

The steady growth of older adult population combined with rising trend in technology uptake within this subpopulation suggest mHealth applications may represent a novel way to improve the health of older adults as well as to reduce healthcare cost. Despite the numerous benefits of mHealth applications,[30–33] relatively little is known about whether older adults perceive that these apps confer such benefits. Their perspectives towards the use of mobile applications for health-related purposes have also been little studied. Therefore, this review aims to identify what is known about the perspectives in adopting mobile applications for health-related interventions among older adults. The specific research questions are:

1. What is the level of willingness among older adults in using mobile applications to monitor and manage their health conditions?
2. What are the existing barriers among older adults in using mobile applications to monitor and manage their health conditions?
3. What motivates older adults to use mobile applications to monitor and manage their health conditions?

METHODS AND ANALYSIS
Protocol development
This study will adopt Arksey and O'Malley's[34] framework for scoping reviews as the foundation and more recent advancements to the methodology[35–37] as well as the updated framework by the Joanna Briggs Institute.[38] According to this framework, there are six different stages which includes[1]; identifying the research question,[2] identifying relevant studies,[3] selecting studies,[4] charting the data,[5] collating, summarising and reporting results and[6] consulting with stakeholders. The scoping review will also adhere to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR).[39] The PRISMA-ScR checklist is attached as online supplementary file 1. International Prospective Register of Systematic Reviews registration is not required as it is a scoping review.

Stage 1: identifying the research question
Arksey and O'Malley[34] describe the definition of a relevant research question as a crucial initial step that define and refines the chosen research strategy. We have identified one overarching research question to guide our systematic search strategy and reporting of results: 'What is known about the perspectives in adopting mobile applications for health-related interventions among older adults?'. We aim to provide answers for the following subquestions:

1. What is the level of willingness among older adults in using mobile applications to monitor and manage their health conditions?
2. What are the existing barriers among older adults in using mobile applications to monitor and manage their health conditions?
3. What motivates older adults to use mobile applications to monitor and manage their health conditions?

Stage 2: identifying relevant studies
The search strategy was collaboratively developed by our research team. To determine the relevance of the citations and to resolve any potential disagreements, the research team will meet to refine the study inclusion and exclusion criteria prior to assessing the articles independently. Our literature search is open, including both peer-reviewed literature as well as grey literature, that is, evidence not published in peer-reviewed publications and from the first 10 pages in the Google search engine.

The identification of relevant literature will consist of three-stage approach. The first stage is searching the

Table 1 List of keywords and synonyms generated as search terms

Mobile application	Older adults	Perspective	Barrier	Facilitates
Mobile app*	Elderly	View	Limitation	Motivate*
mHealth	Ageing population	Attitude	Difficulty	Promote*
Mobile health	Older population	Mindset	Restriction	Help
Telehealth	Ageing	Willingness	Drawback	Ease
Mobile technolog*	Geriatric	Readiness		Aid
		Acceptability		

electronic databases using standardised search terms adapted to the requirements of each respective database. The following electronic databases have been selected[1]: PubMed[2]; Excerpta Medica Database[3]; Cumulative Index to Nursing and Allied Health Literature[4]; Cochrane Library[5]; Google Scholar and[6] ScienceDirect. To achieve the level of comprehensiveness required for scoping review, we will also hand search key electronic journals, including the *Journal of the American Medical Informatics Association*, the *Journal of Medical Internet Research*, the *International Journal of Digital Healthcare*, *Digital Health* and the *Journal of mHealth*. The second stage involves searching the reference lists of literature that meet all inclusion criteria. The third and final stage involves hand searching specific key publications such as identified white papers or conference presentations for any references we may have missed. We will search relevant grey literature databases (eg, Grey Literature Report, OpenGrey, Web of Science Conference Proceedings, Government Document, academic thesis/dissertation) to identify studies, reports and conference abstracts of relevance to this review.

Search terms from key words, subject heading and synonyms such as mobile application*, mobile app*, mhealth, mobile health, telehealth, mobile technolog*, older adult*, elder*, ageing population, older population, aging, geriatric, perspective, view, attitude, mindset, willingness, readiness, acceptability, barrier, limitation, difficulty, restriction, drawback, facilitate*, motivate*, promote*, help, ease, aid will be generated by the research team members to capture any potential resources from

the databases. Table 1 outlines the initial keywords and search terms generated. Boolean operators (AND, OR, NOT) will be used to combine search terms within related keywords. An additional search will be carried out using updated search terms if there are any search terms were missing. table 2 shows the search strings generated.

Stage 3: study selection
The third stage of Arksey and O'Malley's framework[34] aims to identify the studies that will be included in the scoping review. The screening process will consist of two stages[1]: a title and abstract/summary and[2] full-text screening.

In the first stage, two reviewers will independently screen the titles and abstract of the articles where during this stage, the following decisions will be undertaken[1]: for any article that both reviewers agree to include, the article will proceed onto the second stage of screening process where the article will be read in full by each reviewer[2]; for any article that both reviewers agree to exclude, the article will not be read in full and excluded from the study[3]; for any article that did not achieved agreement between both reviewers that is, whether to include or exclude, the article will proceed onto the second stage of screening process to be read in full by each reviewer before final decision is made. In the second stage, both reviewers will independently perform a full-text review of the included articles. Disagreements regarding eligibility of sampled articles will be discussed between the two reviewers until consensus is reached or by arbitration of a third reviewer, if required.

Table 2 List of search strings

Search string 1:	"Mobile application*" OR "mobile app" OR "mHealth" OR "mobile health" OR "telehealth" OR "mobile technology" AND "Older adults" OR "Elderly" OR "Ageing population" OR "Older population" OR "Aging" OR "Geriatric"
Search string 2:	"Mobile application*" OR "mobile app" OR "mHealth" OR "mobile health" OR "telehealth" OR "mobile technology" AND "Perspective*" OR "View" OR "Attitude" OR "Mindset" OR "Willingness" OR "Readiness" OR "Acceptability"
Search string 3:	"Mobile application*" OR "mobile app" OR "mHealth" OR "mobile health" OR "telehealth" OR "mobile technology" AND "Barrier*" OR "Limitation*" OR "Difficulty" OR "Restriction*" OR "Drawback*"
Search string 4:	"Mobile application*" OR "mobile app" OR "mHealth" OR "mobile health" OR "telehealth" OR "mobile technology" AND "Facilitate*" OR "Motivate*" OR "Promote*" OR "Help" OR "Ease" OR "Aid"

PRISMA flow chart 1 will be used in the study selection process and will be updated once the review is completed (see online supplementary file 2).

Eligibility criteria

An article will be included when it:
► Describes or reports older adults' perspectives either their willingness or barriers or motivators towards the use of mobile applications in monitoring and managing their health condition.
► Is published in the English language.
► Contains only older population aged 60 and older as its study population.
► Is a peer-reviewed literature or grey literature.
► Is dated 1 January 2009–April 2019 (time frame of 10 years).

Studies that have been published from January 2009 to April 2019 were selected to be included in this study due to an immense growth reported in the number of mobile health applications download in the past 10 years with growth rate of more than 7% each year.[40]

An article will be excluded when it:
► Provides summaries and do not introduce any new knowledge (eg, literature review, scoping review, systematic review, topical review, commentaries, opinion papers).

Stage 4: charting the data

A data extraction framework will be developed to confirm study relevance and to extract study characteristics. Study characteristics to be extracted will include but not be limited to: standard bibliographical information (ie, authors, title, journal and year of publication), type and objectives of the review will be reported. For each article, we are going to extract the following data[1]: characteristics of the study population,[2] settings,[3] characteristics of the mobile application used or tested and[4] type of outcome assessed (ie, older adults' perspectives; their willingness, barriers and motivators towards the use of mobile applications to monitor and manage their health). A combination of EndNote V.X9 and Covidence software will be used to organise and track relevant data. We will use these softwares to[1] remove duplicates[2]; document and manage the screening process[3]; categorise publications that meet the inclusion and exclusion criteria[4]; extract, organise and search related data and information from the publication content and[5] manage of full-texts version of included publications; including adding relevant notes that include key data extraction insights.

Stage 5: collating, summarising and reporting the results

Using the information collected from the data extraction form, the key characteristics of included studies will be summarised qualitatively and tabulated. All key findings will be described in narrative form. We will also be conducting a content analysis, identify emergent themes with regards to willingness, barriers and motivators from older adults. We will collect and identify objectives and gaps in our understanding of the current state or research. The discussion will be structured based on the themes that emerge.

Stage 6: consultation with stakeholders

This sixth stage of Arksey and O'Malley's framework[34] is an optional component in conducting scoping reviews. We aim to engage with relevant stakeholders such as geriatricians, family medicine doctors, mobile applications developers, dietitians, psychologists and/or clinical psychologists to gain more insights into our data from different perspectives. A detailed design of consultation process will be created after stage five of the methodology (collating, summarising and reporting the results) has completed.

Patient and public involvement

As the review will use secondary data, patient and public will not be involved throughout the study.

Our study is meant to inform experts and stakeholders of the current state or issues concerning our topic. Following successful publishing of this protocol, we intend to submit a systematic scoping review to identify gaps within the research of older adults' perspectives towards the use of mobile application to monitor and manage health and identify what recommendations can be made to improve such gaps.

Ethics and dissemination

This scoping review protocol reports a comprehensive methodology. Since the data used are from publicly available sources, this study does not require ethical approval. Findings from this review will be disseminated through academic journals, seminars and conferences. We anticipate that our findings regarding older adults' perspectives towards the use of mobile applications to monitor and manage health conditions. This could guide the direction of future research and aid technology developers as well as health professionals working in the area of ageing and rehabilitation.

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