

Mobile Health Solutions for the Aging Population: A Systematic Review

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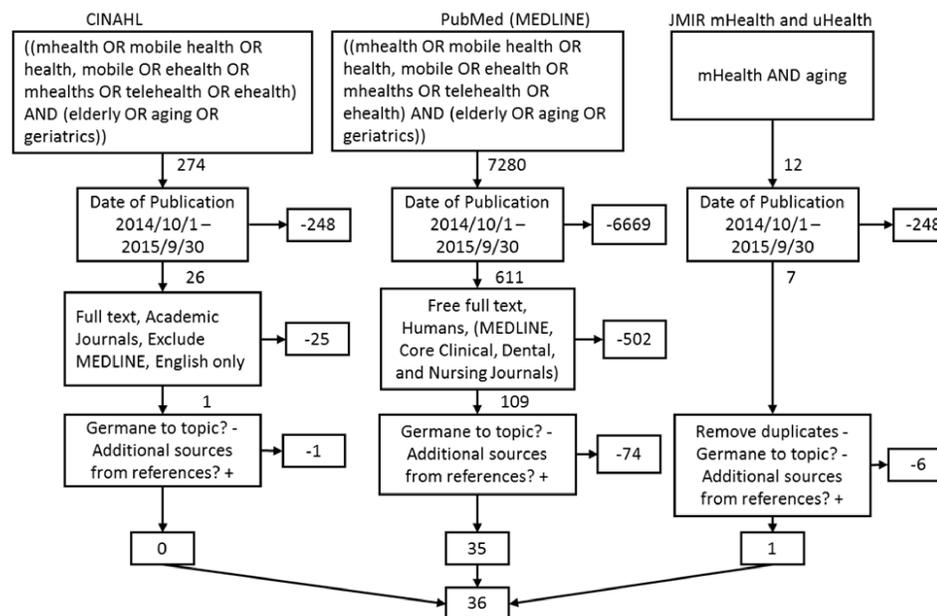
ABSTRACT

Mobile technologies are ubiquitous. New applications are developed and released each day, and mHealth is gaining in both acceptance and popularity. Some researchers are beginning to explore how mHealth can help manage chronic illnesses for the elderly such as diabetes and dementia. This systematic review explores the work that has been done over the last year to lay the groundwork for future RCTs designed around mHealth and the aging of society.

PRISMA 2009 Checklist

Section/topic	#	Checklist item
TITLE		
Title	1	Identify the report as a systematic review, meta-analysis, or both.
ABSTRACT		
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria; participants; and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.
INTRODUCTION		
Rationale	3	Describe the rationale for the review in the context of what is already known.
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).
METHODS		
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I ² for each meta-analysis).

METHODS



• (k=0.82) Kappa statistic demonstrates very strong reliability between reviewers

RESULTS

More than 100 authors in 36 publications identified 113 facilitators and barriers to adoption, most of which were facilitators. Themes were identified and sorted by frequency of occurrence. The three facilitators mentioned most often were *independence* (18%), *understanding* (13%), and *visibility* (13%). The three barriers mentioned most often were *complexity* (21%), *limited by users* (12%) and *ineffective* (12%).

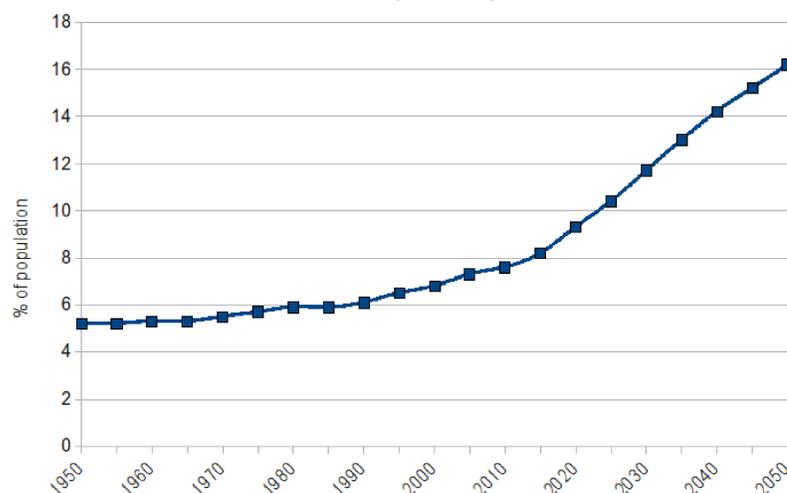
Authors	Facilitators	Themes	Barriers	Themes
Matthews JT, Lingler JH, Campbell GB, Hunsaker AE, Hu L, Pires BR, et al [14]	<ul style="list-style-type: none"> Reveal daily caregiving challenges to health care providers, Patients with dementia are willing to wear it, Making life easy, convenient, and comfortable, Easy to wear 	<ul style="list-style-type: none"> visibility acceptance quality of life convenient 	<ul style="list-style-type: none"> invasion of privacy cumbersome, obtrusive, Cost, security 	<ul style="list-style-type: none"> invasive cumbersome inconvenient cost security
Greenhalgh T, Procter R, Wherton J, Sugarhood P, Hinder S, Rouncefield M [15]	<ul style="list-style-type: none"> Technologies can extend the existing support provided by the family or professional careers, 	<ul style="list-style-type: none"> family and physician extenders 	<ul style="list-style-type: none"> Interoperability, need skilled human work, Must be customized, Cost, low level of organizational readiness for the tech, Not designed well 	<ul style="list-style-type: none"> interoperability complex set up cost org not ready clunky
Moffet H, Tousignant M, Nadeau S, Mérette C, Boissy P, Corriveau H, et al [16]	<ul style="list-style-type: none"> Cost savings of delivering through telecare, enables more independent living 	<ul style="list-style-type: none"> cost independence 	<ul style="list-style-type: none"> Although costs are down, they are significant enough to create a digital divide between classes 	<ul style="list-style-type: none"> exclusive



AGING POPULATION

Percentage of the World Population Over 65, 1950-2050

Source: UN World Population Prospect, 2008



OBJECTIVE

Identify and analyze facilitators and barriers identified in the literature over a 12 month period of time for adoption of mobile technology and mHealth applications to assist in the care of the aging population.

FACILITATORS

Facilitator	Occurrences		
independence	21,24,26,27,29,32,36,38,40,47,48	11	18%
understanding	17,20,29,35,41,42,46,48	8	13%
visibility	14,18,25,27,29,30,33,34	8	13%
effective	29,30,36,39,44,46	6	10%
outcomes	18,30,36,37,47,49	6	10%
communicative	19,21,28,31,36,45	6	10%
quality of life	14,21,22,29,43	5	8%
cost	16,27,37	3	5%
acceptance	14,16,43	3	5%
access	31,37,46	3	5%
convenient	14	1	2%
		60	

BARRIERS

Barrier	Occurrences		
complex / org not ready	*15,17,20,35-37,41,42	9	21%
limited by users	22-24,28,34	5	12%
cost	14,15,19,33,43	5	12%
ineffective	30,32,48,49	4	9%
exclusive	16,21,30,46	4	9%
privacy / security / invasive	*14,25,33	4	9%
unmarketed / cumbersome / inconvenient	*14,36	3	7%
misunderstood / rejection	19,31,36	3	7%
diffusion	36,37	2	5%
unproven	27,39	2	5%
inefficient / long set up	15,45	2	5%
		43	

*multiple occurrences in same article

CONCLUSIONS

As mHealth technologies grow, emerging applications of the technologies will undoubtedly have valuable life changing uses for the elderly population, and all populations could benefit from them. The application of new technologies has the potential to change the course of health care as it is provided today, and improve outcomes.

The work that has been done thus far illustrates the level of acceptance and feeling of independence mobile technologies enable for the elderly population. Future research should focus on the existing complexity of mHealth and medical literacy of the elderly population.

This manuscript is currently under review at the Journal for Medical Internet Research, mHealth and uHealth, Manuscript ID 5330