

Emerging technologies with potential care and support applications for older people: a review of grey literature

Sarah Abdi, Prof Luc de Witte and Prof Mark Hawley

Center for Assistive Technology & Connected Healthcare • School of Health and Related Research (SchARR) • sabdi1@Sheffield.ac.uk

Background

- ❖ The number of older people with unmet care and support needs is increasing substantially due to the challenges facing the health and social care system as well as family carers [1].
- ❖ Emerging technological developments have the potential to address some of the care and support challenges of older people as well as address common barriers of technology adoption among older people [2, 3].
- ❖ For example, recent advances in conversational platforms enabled by Artificial Intelligence are said to simplify end users' engagement with digital technologies by reducing the need for complex skills to navigate websites or other interfaces [3]. Arguably, this could help address older people's limited digital skills.
- ❖ However, there is limited evidence synthesis that provides an overview of emerging technologies with potential care and support applications for older people. Majority of recent work has focused on exploring the effectiveness and perceptions of specific technologies.

Research question

What is known from the existing literature about emerging technological developments that could have potential care and support applications for older people living at home?

Methods

- ❖ A scoping review was conducted based on the Arksey and O'Malley's framework [4].
- ❖ Literature searching was restricted to grey literature documents, given that most overviews and analyses around emerging technologies tend to be found in grey literature documents such as science and technology institutes reports.
- ❖ Sources included: 1) reports from key organisations; and 2) ongoing research activities through analysing EPSRC funding data.
- ❖ A narrative synthesis approach was used to analyse and summarise the findings.

Emerging technologies are technological developments that are characterised with novelty, rapid growth and potential socio-economic impact

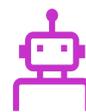
Care and support needs are challenges that arise from living with chronic conditions such as difficulty in mobility, self-care and household activities

Main findings

- ❖ A total of **65 documents** were included in the final analysis.
- ❖ One of the first findings of the review was that recent technological developments are **complex** and **deeply connected**, where advances in one field influence the development of other fields and new innovations are often **outcomes of complex interactions** between these fields. In order to disentangle this complexity and facilitate the identification of emerging technologies with potential care and support applications for older people, technologies were categorized into- **a) Enabling emerging technologies ; and b) Emerging technological applications.**

Enabling emerging technologies

Technological developments **enabling and driving** recent technological advances with potential care and support applications for older people.



Artificial intelligence

-Allows the automation of human-like tasks



Emerging human-computer interfaces

-Offers new ways of interacting with the computers such as using voice, emotions, and brain signals



Sensor technology

-Allows the measurement of various aspects of our lives (e.g. monitoring health parameters)
-A core component of Internet of things (IoT)



Advanced robotics



Advances in connectivity and computing

(e.g. 5G and edge computing)
-Improves the connectivity of devices and enhances users' digital experiences

Emerging technological applications

Emerging technologies that could potentially be used to meet older people's care and support needs and are enabled by the above technologies.



Self-driving vehicles

-Offer new transportation models and could meet mobility and transportation needs of older people in future.



Voice activated devices

-Can act as home digital helpers that assist older people with tasks such as providing information, medication reminders and video calling.



Assistive autonomous robots

-Can help support some of the self-care, household needs as well as social needs of older people.



Virtual, augmented and mixed reality

-Can support home entertainment as well as mental health of older people.



AI-enabled apps and wearables

-An example in this category is AI-based chatbots which could provide advice to support treatments/diagnosis of chronic conditions (e.g. CBT & medical triage).



New drug release mechanisms

-An example in this category is digital pills that have been developed to deliver drugs automatically using a system that involves biosensors, smart apps and wearable sensors.



Intelligent homes

-Allows remote health monitoring.
-Allows automated home experiences.



Portable diagnostics

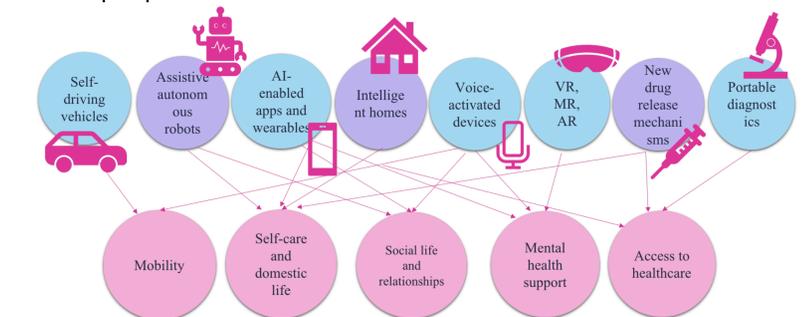
-Could bring disease diagnosis closer to older people and facilitate their access to healthcare services.

Conclusion and implications

- ❖ Emerging technologies with potential care and support applications for older people are **complex and interconnected**. This could mean the need to draw on knowledge and expertise from various technological fields in order to maximise the potential of these technologies.
- ❖ We can expect that more **connected, automated and interactive** technologies to play a role in the care and support of older people in the future.
- ❖ The importance of using **human-centred design** principles and involving older people during the different stages of technology design and development. Due the dynamic nature of emerging technologies, these technologies could still incorporate older people needs during the cycle of design and development resulting in products that meet the needs of older people

Current work

Technologies identified were mapped against the care and support challenges identified from a **scoping review and interviews** with older people with care needs



- ❖ Results are being shared with **21 experts** in the R&D of health and social care technologies to help identify technologies with most potential to meet older people's care and support needs.
- ❖ Future work will involve working closely with older people and other stakeholders, such as family and formal carers, to **co-design** some of the technologies identified.

References

1. Vlachantoni A. Unmet need for social care among older people. Ageing Soc 2019; 39(4):657-684. doi:10.1017/S0144686X17001118
2. Pettigrew S, Cronin SL, Norman R. Brief report: the unrealized potential of autonomous Vehicles for an aging population. J. Aging Soc. Policy 2019; 31(5):486-96. doi: 10.1080/08959420.2018.1500860
3. Asbjørn Følstad and Petter Bae Brandtzæg. Chatbots and the new world of HCI. Interaction . 2017; 4:38-42. doi: 10.1145/3085558
4. Arksey, H. and O'Malley, L. Scoping studies: towards a methodological framework. International journal of social research methodology 2005; 8 (1), pp.19–32.