Factors that influence older people’s engagement with digital health technology


Abstract
Digital health technology (DHT) encompasses a wide range of applications and interventions with the potential to address the health needs of an increasingly ageing population. Older people’s engagement with DHT depends on many factors, and this article summarises understanding of the barriers and facilitators to DHT uptake and continued use among older people. Older people’s confidence in using digital technology, their perceptions of personal benefit from DHT, its design, and the support they receive from health professionals and carers in using DHT all affect their level of engagement. Understanding these barriers and facilitators among the older population creates ways to enable greater numbers to benefit from DHT. This article provides information for those who work with, or design digital health interventions for, older people to help them to influence older people’s engagement with these rapidly evolving healthcare innovations.

Keywords
barriers, digital health, facilitators, innovations, older people, technology

AN INCREASING number of older people in the UK have health and well-being needs. The population of over sixties in the UK is estimated to increase by 20% by 2024 (Office for National Statistics 2015) and there will be an associated increase in the number living with long-term physical and mental health conditions, such as cardiac failure and dementia, and with frailty (Age UK 2017).

Digital health technology (DHT) is evolving rapidly to address some of the needs of the older population. DHT is a broad term that includes telecare, such as mobile phone-based digital communication, and ambient monitoring devices, such as wearable technology that measures mobility and risk of falling. Such technology is linked to desktop computers, tablets and/or smartphones, as well as to bespoke devices.

Health and well-being information can be recorded or simultaneously communicated to enable health professionals to provide individualised advice or care. Examples include personal alarms that link to emergency services and global positioning system (GPS) monitoring for those who may be at risk due to wandering, thereby improving speed of access to older people who require help. DHT can assist people to live well, and give them more autonomy to access health and social care services when they require advice or assistance. It can also enable people to share in decision making about activities designed to meet their well-being and health needs.

The rapidly changing digital healthcare environment and its potential benefit to older people are important to understand. This article explores some of the important facilitators and barriers for older people in their uptake, engagement with and use of DHT.

Uptake and engagement
The literature demonstrates that DHT uptake by older people is strongly influenced by perceived benefits, timing of introduction, design features, effect on dignity and cost.

Perceived benefits of DHT
Older people’s perception of the benefit of DHT influences their uptake. The two most frequently identified reasons older people use DHT are to improve their management of long-term conditions and their safety at home.

Better management of long-term conditions
In Reade et al’s (2017) study of older people’s use of smartphones to monitor symptoms of rheumatoid arthritis, users were highly motivated to participate because they perceived they would benefit and would provide researchers with clinically relevant information. Middlemass et al (2017) found that older people with chronic obstructive pulmonary disease (COPD) engaged with DHT...
to monitor their health trends and detect the onset of infection early. A study by Currie et al. (2015) involved older people with long-term pain who, although they lived in rural areas, could access specialist pain management staff and participate in group sessions through a web-based application. They cited their reduced need to travel for treatment as a perceived benefit of engagement with DHT.

*Improved safety at home*
Ambient assisted living technologies, such as mobility monitoring devices, are a form of DHT that permits users to remain at home for longer and access previously inaccessible areas of their homes (Hamblin 2017), both of which encourage initial engagement. Older people also say that DHT can help them to manage communication about falls. After setting up a focus-group discussion, Williams et al. (2013) found that, by wearing falls sensors on their wrists, older people felt reassured and more independent.

*Timing of DHT introduction*
The timing of DHT introduction, particularly for helping self-management of a condition soon after initial diagnosis, is important in ensuring engagement. For example, some DHT users newly diagnosed with osteoarthritis (Algeo et al. 2017) or angina (Devi et al. 2014) say they have been encouraged to engage with DHT by self-care information and techniques provided by web-based programmes. Current and potential users of DHT also say that introduction of DHT immediately after a significant event, such as hospital discharge or surgery, would increase its effectiveness (Holliday et al. 2015). However, age and severity of illness are factors in DHT engagement, with some older people saying that only a high level of need or severe illness would warrant the use of DHT devices (Sanders et al. 2012, Doyle et al. 2014, Lie et al. 2016), or that interventions such as web-based programmes are for younger age groups (Currie et al. 2015). Such perceptions are important to consider and manage if DHT is to be encouraged among older people.

*Competency and confidence with digital technology*
Older people’s competency and confidence in using new technology affect DHT uptake, but can be influenced by collaborative design involving older people, and by provision of the relevant guidance and education. Older users’ understanding of the function of devices, such as modems and routers, can influence their engagement, especially with home telehealth equipment, such as tablet or smartphone applications (Sanders et al. 2012, Doyle et al. 2014). However, recent studies suggest that a lack of technological knowledge is not a barrier to DHT uptake and design is a more important factor (Middlemass et al. 2017), with older users preferring simple user interfaces (Doyle et al. 2014) without large blocks of text or medical jargon (Algeo et al. 2017).

Co-creation with older users of the DHT interface can improve uptake, especially in the development of electronic assisted living technologies (Holliday et al. 2015).

*Effect on dignity*
In finding ways to encourage uptake, the marketing of DHT products is also important. Through focus groups with older people, Holliday et al. (2015) found that products marketed for frail or disabled people did not appeal to them. Where potential users have co-designed DHT products, such as wearable fall sensors, they report they do not feel stigmatised when wearing the devices in public, which suggests that uptake may be encouraged through a co-creation approach (Williams et al. 2013, Holliday et al. 2015).

Older people have also raised concerns about the trustworthiness of DHT and its ability to maintain users’ privacy. Older people are concerned about the kinds of data collected by DHT and whether it records aspects of their lives that they have not consented to sharing, and they want confirmation that this is not going to happen before they use it (Doyle et al. 2014). Such anxiety and distrust can be overcome if the purpose of DHT devices is explained in person (Doyle et al. 2014). Users also want to understand, and have control over, how their data will be presented to others (Lie et al. 2016).

*Cost*
Funding is another issue that older people consider important in their decisions to use DHT, but becomes less of a concern if users think it will benefit them. Funding may also be less of a concern for older people who work (Holliday et al. 2015).

*Continued use of DHT*

*Re-evaluating benefits*
The continued use of DHT by older people depends on their re-evaluation of its ongoing benefits, how its design enables varied and interesting ways to engage with it, and its effects on users’ behaviour and relationships with those around them. Some literature identifies that difficulties in using DHT can seem to outweigh its perceived benefits, leading to its use being discontinued. For example, some older people...
reported their freedom had been diminished rather than increased by DHT that uses GPS to monitor their location because its batteries require frequent recharging (Hamblin 2017). Such experiences could be avoided with improved technology and co-created design.

Poor integration of DHT with users’ existing technology can also restrict continued use. For example, users of smartphone applications who have no regular or reliable access to Wi-Fi often find the technology to be too slow, or memory storage too small, for the DHT to be of any value (Reade et al 2017). Users who experience malfunctions in DHT have less intention of continuing its use (Hamblin 2017, Reade et al 2017), even if the malfunctions were caused by them forgetting to charge their device.

Doyle et al (2014) found that these negative experiences of DHT use can be overcome by proactivity in design features and support services. For example, DHT can be fixed remotely and remind users when to replace batteries in their devices, and services can ensure that technical help response times are fast. For older people living in rural locations, however, poor internet connection is a barrier to DHT use, due to slower download speeds and inability to use videoconferencing software. When identifying potential users living outside urban areas, therefore, it is important to consider the appropriateness of DHT that relies on web-based services (Currie et al 2015).

Experiences such as these, where technology did not live up to users’ expectations, can prevent continued use. However, the literature identifies some successful DHT introductions that have encouraged ongoing use. One example, described by Williams et al (2014), involved a tablet-based intervention to support self-management among people with COPD. When interviewed six months after commencing use of the DHT, participants said it had given them more control of their condition, helped them to understand their oxygen saturations and meant they needed less reassurance from healthcare professionals (Williams et al 2014). The website-based dizziness management programme reported by Essery et al (2017) is another example of successful DHT. Users noticed improvements in their symptoms, which motivated them to continue with an exercise programme, despite the challenging nature of its exercises.

Behaviour change and self-management

Continued use of DHT can influence positive behaviour change and is recognised as a behaviour change technique by the National Institute for Health and Care Excellence (2014). The NHS apps library includes smartphone-based applications designed to change behaviour (McMillan et al 2016), usually in people without long-term conditions. Some enable users to set individualised goals (Deví et al 2014, Algeo et al 2017) and monitor their progress using diaries to record the amount of exercise they take or trends in symptoms (Deví et al 2014, Williams et al 2014). Exercise-based interventions can give positive feedback at regular intervals, reassure and inform users of their progress, and thereby encourage ongoing use (Doyle et al 2014, Essery et al 2017). A lack of feedback is often viewed negatively by users of DHT and Middlemass et al (2017) found people using DHT for managing respiratory or heart disease would have preferred input on their progress from medical staff.

Support and peer networks

Social support, such as through peer networks, influences continued use of DHT. For example, users of a smartphone application to track rheumatoid arthritis symptoms suggested that access to an online forum would help them to maintain their engagement; however, this may reflect the needs of a relatively younger group of participants (Reade et al 2017). A website for dizziness management included ‘retraining stories’ as a means of sharing experiences of the intervention (Essery et al 2017), and could be considered a form of social or peer support. Other DHT applications include the facility to contact a cardiac nurse by email or a scheduled chatroom session (Deví et al 2014), which offer a social and professional support network.

Despite the potential for DHT to increase older people’s autonomy in managing their health, the involvement of relatives, carers and healthcare professionals influence its continued use. Older people with long-term conditions, such as COPD and heart disease, feel reassured that DHT allows healthcare professionals to monitor their condition and intervene if necessary (Middlemass et al 2017). However, a balance should be struck between DHT use and human involvement with users. Users of DHT may perceive that the amount of support they receive from monitoring staff has reduced, especially if someone they were not expecting attended their home in response to an alert triggered by their DHT (Hamblin 2017).

A lack of integration between older people’s usual sources of care and DHT could lead them to discontinue DHT use (Sanders et al 2012). DHT could also be perceived as disrupting established routines on which users rely, such as check-in calls by relatives, or as a threat to in-person visits by carers or healthcare staff (Sanders et al 2012, Lie et al 2016).
The timing of DHT introduction is also important in that, the sooner DHT is offered to potential users after their initial diagnosis or identification of needs, the greater the likelihood they will recognise its benefit.

Barriers to uptake or continued usage of DHT can arise when older people lack confidence in, or perceive a lack of support for, their use. Providing reliable sources of technical, professional and social support, as well as preparatory education, during DHT introduction should be considered to encourage uptake and maintain engagement. Users should also be reassured that DHT is trustworthy and will not have a negative effect on their dignity. Reassurance that DHT use does not mean a complete removal of other health or care support services is also important in managing concerns.

Enabling older people to engage with DHT has the potential to improve their health and well-being. By addressing the facilitators and barriers identified in this article, healthcare practitioners and DHT designers can work more effectively alongside older people, and can start to maximise the potential benefits of this innovative technology.

**References**