

*Investigating the enabling factors
influencing occupational therapists'
adoption of assisted living technology*

Article

Accepted Version

McGrath, C., Ellis, M., Harney-Levine, S., Wright, D., Williams, E. A., Hwang, F. ORCID: <https://orcid.org/0000-0002-3243-3869> and Astell, A. ORCID: <https://orcid.org/0000-0002-6822-9472> (2017) Investigating the enabling factors influencing occupational therapists' adoption of assisted living technology. *British Journal of Occupational Therapy*, 80 (11). pp. 668-675. ISSN 1477-6006 doi: <https://doi.org/10.1177/0308022617711669> Available at <https://centaur.reading.ac.uk/73591/>

It is advisable to refer to the publisher's version if you intend to cite from the work. See [Guidance on citing](#).

To link to this article DOI: <http://dx.doi.org/10.1177/0308022617711669>

Publisher: SAGE

All outputs in CentAUR are protected by Intellectual Property Rights law, including copyright law. Copyright and IPR is retained by the creators or other copyright holders. Terms and conditions for use of this material are defined in the [End User Agreement](#).

www.reading.ac.uk/centaur

CentAUR

Central Archive at the University of Reading

Reading's research outputs online

Investigating the enabling factors influencing occupational therapists' adoption of assisted living technology

Short Title: Occupational therapists' adoption of technology

Abstract

Introduction. Research into technology adoption has focused on older adults' motivations, with less exploration of the perspective of healthcare providers, including Occupational Therapists, who are often described as the gatekeepers to assisted living technology (ALT). **Method.** This qualitative study utilised semi-structured interviews and focus groups with twenty Occupational Therapists in England and Scotland. The goal was to identify those enabling factors necessary for Occupational Therapists to adopt assisted living technology. **Results.** Five themes emerged regarding the enablers needed to support the adoption of assisted living technology by Occupational Therapists including: 1. a positive client-therapist relationship; 2. affordability; 3. time; 4. increased awareness, education, and training; and 5. usability features of the assisted living technology. **Conclusion.** With an aging population and the increasing role that technology is playing globally in older adults' lives, it has never been more important for Occupational Therapists to harness the potential of new, developing, and existing technologies to support people to live and age as well as possible. To accomplish this, however, requires that Occupational Therapists are equipped with the time, training, and education necessary to offer their clients ALTs that are client-centered, usable, and affordable.

Keywords: occupational therapists, technology adoption, assisted living technology

Introduction

Globally, the population is aging. By 2050, the number of older adults (aged 60 years and older) will be approximately 2 billion persons, making up for 22% of the world's population (Weinberger, 2007). Within the UK, it has been predicted that by 2034, 23% of the population will be over 65 years of age (Office for National Statistics, 2012). With this unprecedented growth in the aging population, it has become increasingly important to advance the availability and uptake of resources and supports. Among these, technology is an area of growing interest.

Current interest in technology and aging, has been propelled forward not only out of demographic necessity, but also due to a number of trends, including the increasing proportion of older adults aging with disability, the increasing costs of healthcare provision, the importance older adults place on aging-at-home, and the desire, on the part of industry and government, to address the health care needs of the aging population by means of technological development (Schulz et al., 2015; Rashidi and Mihailidis, 2013). To leverage the benefits of current and future devices to support people to live and age as well as possible, improving understandings of the factors influencing adoption of assisted living technology (ALT) is essential.

Occupational Therapists are at the center of enabling the occupational engagement of older adults in, community, long-term care, and acute-care settings, and are therefore often the 'gatekeepers' to ALT. Assisted living technology is commonly defined as "any item, piece of equipment or product system whether acquired commercially off the shelf, modified, or customized that is used to increase, maintain or improve functional capabilities of individuals with disabilities" (Cook and Polgar, 2007: 5). When prescribed and used appropriately, ALT can increase older adults' independence, support social engagement, enhance wellbeing, increase personal safety, allow

older adults to stay in their homes longer, and lessen the burden on statutory services (Coughlin et al., 2007; Lewin et al., 2010). Despite these documented benefits, research suggests that 30-50% of ALTs are abandoned (Riemer-Reiss and Wacker, 2000), resulting in significant costs to the healthcare system and limiting the ability of older adults to engage successfully in their desired occupations (Polgar, 2006).

Various stakeholder groups have an interest in ALTs including: the individuals who directly use ALT; their family and friends; the technology designers, developers, and distributors; and the health and social care providers prescribing ALTs. Each of these groups has a unique set of needs as well as perceived barriers to technology adoption. Although research has focused on understanding older adults' motivations to technology acceptance, adoption, and integration, less is known about the enablers and barriers to technology adoption from the perspective of health and social care providers. The views of health care providers, specifically Occupational Therapists are critical as “these technologies will change the practice of occupational therapy and will alter the nature and practice of therapeutic relationships” (Schaper and Pervan, 2004: 734). As such, the goal of this study was to qualitatively explore the perceptions of twenty Occupational Therapists working with older adults regarding the enabling factors that need to be in place to support their ability and comfort in prescribing ALTs to their older adult clients.

Literature Review

Reasons for ALT Abandonment

Chen and Bode (2011) proposed that factors influencing technology adoption come from three separate, but interrelated, locations including: the patient, the provider, and the context (such as the healthcare system). First, with regards to the patient, the adoption of technologies targeted at older adults has been relatively slow over the past forty years (Coughlin et al., 2007; Wielandt et

al., 2006). The reasons for this are multifaceted and include: affordability; uneven access; insufficient education, referral, and management by the healthcare provider; and usability concerns such as aesthetics, reliability, durability, the ease of use/learning, comfort, maintainability, and perceived usefulness to the user (Clark and McGee-Lennon, 2011; Jimison et al., 2008; Shah and Robinson, 2006; Spafford et al., 2010; Wielandt et al., 2006). Coughlin et al., (2007) further identified issues of self-preservation as a primary barrier to technology adoption, whereby users are concerned about the message that adopting ALT may give about them. Specifically, concerns about being perceived as frail, incompetent, dependent, and relinquishing control are often high and are at odds with how older individuals perceive themselves and/or wish to be perceived by others (Barnhart and Peñaloza, 2013; Dove et al., 2017). Second, in regards to the provider, health and social care staff have identified additional barriers to ALT adoption including: high costs; a lack of accurate knowledge of the range, scope, and capabilities of ALT; improper training in the use of ALTs; and a lack of time necessary to adequately assess, implement, and evaluate ALTs prescribed for their clients (Clark and McGee-Lennon, 2011; Lewin et al., 2010; Wherton et al., 2015). Lastly, regarding the context, a variety of organizational conditions have been identified as necessary to support technology acceptance among health and social care providers including: the provision of protected time for training; the availability of necessary infrastructure and support; better information sharing and coordination of services within and between ALT services/providers; and better financial incentives for health care services to implement ALT (Wherton et al., 2015).

Occupational Therapists Views on ALT Adoption

The insight of healthcare providers, including Occupational Therapists, is extremely valuable at all stages of the technology development and deployment process (Atwal et al., 2014). Although

much research has focused on understanding end users' motivations to technology acceptance, adoption, and use, less research has explored the barriers and supports to technology adoption from the perspective of health and social care providers (Ifinedo, 2012). Research that does focus on health care providers is often limited to the acute-care setting and the physicians that work within it (Dreiseitl and Binder, 2005). Technology acceptance research that is inclusive of allied health professionals is necessary, though presently sparse with a few notable exceptions (Clark and McGee-Lennon, 2011; Atwal et al., 2014; Ifinedo, 2012; Chen and Bode, 2011). Understanding the perspectives of Occupational Therapists is crucial because a therapists' acceptance of, or reluctance to, ALT can influence the quality of care provided as well as a patient's rehabilitation outcomes. A large-scale survey of Occupational Therapists in Australia investigated their willingness to accept and utilize information and communication technology (ICT) (Schaper and Pervan, 2007a) in line with the Unified Theory of Acceptance and Use of Technology (UTAUT; Venkatesh et al., 2003). The results highlighted "sociotechnical and system issues" as critical factors in improving ICT acceptance in healthcare organizations along with interpersonal factors, including relationships (Schaper and Pervan, 2007b). Further exploration of how these factors operate at the ground level is required to ensure future technology expansion.

The primary objective of the Challenging Obstacles to Assisted Living Technologies (COBALT) project was to engage with older adults (aged 65+) and health and social care professionals located in Scotland and England, about decision-making regarding technology adoption. A sample of health and social care staff, including Occupational Therapists, were recruited. The goals for this specific study were: (1) to identify what Occupational Therapists perceive as the enabling factors that need to be in place to support their ability and comfort in prescribing ALT to their older adult

clients; (2) to understand how Occupational Therapists overcome obstacles to the use of ALT for their clients and; (3) to recommend solutions.

Method

Ethics approval was obtained for the research study. The study undertook a qualitative approach, using semi-structured in-depth interviews (DiCicco-Bloom and Crabtree, 2006) and focus groups (Kreuger and Casey, 2000) as the primary data collection methods. To gather a wide range of opinions and experiences, which reflect the diversity of health and social care services within the UK, staff from a range of disciplines and services was recruited to COBALT, including Occupational Therapists, Physical Therapists, Nurses, and Social Workers. This study, however, will only share findings from the Occupational Therapist participants.

Health and local authority management were requested to circulate an email regarding the study to staff who then contacted the researcher directly if they were interested in participating. Those staff members then put the research team into contact with additional eligible staff members. Participants were eligible to participate in the study if: a) they were employed as a health or social care professional in England or Scotland; b) they worked with older adults aged 65 years and older; and c) they could communicate effectively in English. Written informed consent was obtained from all study participants. In total, twenty Occupational Therapists participated in the semi-structured in-depth interviews (n=11) and focus groups (n=9).

The semi-structured in-depth interviews were the first method of data collection. The interviews occurred over a period of five months and included 13 health and social care staff (n=3 Scotland; n=10 England), of which 11 worked as Occupational Therapists (labeled P1-P11) in both hospital and community settings. Their number of years working in Occupational Therapy ranged between

two and sixteen years. All interviews were scheduled on a date and time that was convenient for the participant, including daytime and evening appointments. Participants were also invited to choose where interviews occurred. Although most interviews took place at the participants' place of work, two participants chose to complete their interview in a private meeting room at the researcher's place of work. Interviews took between 16-52 minutes to complete (mean length=34.18 min). Each participant was asked a series of questions as per the interview schedule.

The second method of data collection consisted of focus groups that were participant-led. Three focus groups were organized (labeled Focus group 1, 2 and 3). Two sessions took place in England (Focus group 1: n=7; Focus group 2: n=6) at a local teaching hospital. Two Occupational Therapists participated in the first focus group, while the second focus group was comprised exclusively of Occupational Therapists working in a wide range of practice areas including: spinal cord injury, rheumatology, geriatrics, general medicine, and respiratory rehabilitation. The third focus group took place in Scotland (n=10) with mixed professionals, including one Occupational Therapist working in geriatric mental health. The focus group sessions took place over the lunch hour and ranged in time from 90-120 minutes (mean length = 105 min).

During the focus group sessions, participants engaged in a variety of interactive activities developed as part of the COBALT mission to develop novel tools to engage with health and social care staff about technology (see: cobaltproject.net). In the first icebreaker activity, each participant was asked to identify the top barrier and top enabler to using ALT in the workplace. The second activity asked participants to work in pairs to discuss current ALT service in their locality. The third activity asked participants to identify their ideal ALT service delivery model in their locality. Participants were encouraged to work with someone that was not from their service, to encourage collaborative working relationships but also to help address the challenges inherent in a lack of

integration between services. Two vignette sessions were also held with the focus group participants. During these sessions, participants were asked to work, in groups, through a variety of case scenarios to determine how each of the healthcare providers job roles linked to the case and the provision of assistive technology.

All data were audio and video-recorded and transcribed verbatim. Each transcript was analysed by the first author, however, resulting codes and categories were refined through ongoing team discussions between the first and last author to engage in collective reflexivity, which expanded possibilities for coding. Each transcript was coded individually, using both low level (open) and high level (theoretical) coding to develop rich understandings of the data before codes were compared across participants to form categories and themes (Carspecken, 1996).

Results

Five overarching themes emerged regarding the enablers that need to be in place to support the adoption of assisted living technology by Occupational Therapists. These enabling factors included: 1. a positive client-therapist relationship; 2. affordability; 3. time; 4. increased awareness, education, and training; and 5. usability features of the ALT. Prior to discussing these enablers, the authors have sought to situate the research contextually by providing a description of how participants defined ALT relative to the definition adopted for this study. Within the presentation of the results, code numbers are used to identify participants, and the names of people, places, and organizations have been removed from quotes to protect participant anonymity.

Defining assisted living technology

Just as the definitions of ALT vary in the literature, so too did the definitions of what constitutes ALT among the Occupational Therapists interviewed. As an example, most of the ALT described

by study participants was electronic or battery-operated devices, while participants were more dismissive of simple, well-known assistive technologies. For example:

“Because I think assistive technologies would be a technology like a computer or a mobile phone or something, not necessarily a pair of crutches because...you think more the electronic technology don't you as opposed to just your normal, run-of-the-mill equipment like a walking frame or something” (P2).

“We have access to a store for things like bath boards and raised toilet seats but I wouldn't call that assistive. In my head, I suppose assistive technology is more the gadgets...like if it has a battery” (P9).

In the transcripts, a total of 21 ALTs were discussed by participants, of which five were non-electronic devices such as: a raised toilet seat, bath board, long handled reacher, perching stool, and grab bars. The other devices were electronic or battery-operated such as: a power wheelchair, scooter, closed circuit television (CCTV), computer/laptop, electric hoist transfer, chair raise, bed levers, door alarms, loop systems, flash doorbell unit, vibrating pillow, fall belts, bed sensors, electronic pill dispenser, and large button telephone. This nearly exclusive focus on electronic ALTs contrasts with the traditional definition adopted for this study and may indicate a change in Occupational Therapists perceptions of ALTs.

1. Positive client-therapist relationship

A key role of Occupational Therapists is in the assessment and provision of ALT to enable clients to perform their desired occupations independently and safely. A positive client-therapist relationship, grounded in the principles of trust and client-centered practice, is necessary to support the adoption of ALT by older adults. A focus on person-centered practice instead of a technology-

led process means that Occupational Therapists work towards matching the technological solution to the person and, at times, recognize that technology may not be the best solution. For example:

“It’s got to be very much what the client wants, and I think if you start off with that approach, you’re a lot more likely to get engagement and use, continued use...I think the approach about being client centered and what the patient wants to achieve is essential and you would hope that if that was done well and that relationship was honest and open between the therapist and the client then whatever was recommended or accepted would be used” (P3).

Another key factor necessary to support ALT adoption by older adults is the use of an at-home comprehensive assessment, whenever possible. To ensure ALTs are appropriately recommended and used, it is imperative that a one-on-one visit is made at the point of device prescription as well as training, to ensure the older adult learns to use the ALT within the home and/or community environment where the ALT will ultimately be used:

“The other option is to go home with that person and try out the things [referring to ALT] that they have to do and then if that client is engaged in that process, their compliance with whatever is recommended will be good hopefully” (P3).

Informal social support networks (family and friends) often play a vital part in supporting ALT adoption. As such, there is an important role for Occupational Therapists to assess an older adults’ informal support network and prescribe ALTs relative to their available resources. By including the social support network in the process, Occupational Therapists can increase the likelihood of their clients adopting ALT. For example:

“The family are the enablers in saying, “we want you to have it”, and “we need you to have it so that we can go out and leave you for a little while” (Focus group 2).

Lastly, how an ALT is presented by the Occupational Therapist is key in supporting adoption. For example, older adults must be made to appreciate that the prescription of an ALT is an aid, not a suggestion that they are unable to manage or cope on their own nor is it being recommended as a precursor to institutionalization or as a replacement for hands-on human care. Given the number of fears articulated by their older adult clients, the issue of how ALTs are presented is a central concern for Occupational Therapists. For example:

“I know there is a big fear about technology, about it as a cost-cutting method for local authorities and it will replace hands-on care” (P11).

“You must be very careful how you handle the technology and show them the technology as well...It’s introducing them in the right manner you know. I think a common one for me is suggesting community alarms to people. The very fact that you’ve suggested it or having it makes them feel old, makes them feel elderly when they don’t feel like that” (Focus group 3).

2. *Affordability*

Occupational Therapists identified costs paid by their older adult clients as one of the most frequently cited barriers to technology adoption. Cost, particularly ongoing costs, often became the primary factor that older adults reviewed and revisited when determining whether to integrate a technology into their daily lives. For example:

“Sometimes people are very interested in the service and then you introduce the fact that they’re going to have to pay for it and they don’t want it anymore” (Focus group 1).

“I think that [referring to cost] is probably one of the biggest barriers for people. A lot of elderly people, the idea of committing themselves to a monthly charge for something, particularly if they’re not convinced they need it anyway” (P4).

The cost of ALT is further complicated when older adults are not offered an opportunity to adequately trial the device/technology prior to purchase to ensure it meets their occupational needs. Indeed, without the opportunity to trial the device in their home/community environment, participants described their clients as understandably reluctant to purchase ALT. For example:

“We haven’t got a budget for people to borrow...so I’m conscious that some of it is high cost and people are trying them and they may not work...I think there needs to be more opportunity for people to try things out...because I think sometimes talking about something and asking them if they want that, well how do you know if you want it when you’ve not even tried it?” (P7).

“I don’t have demo models so patients must purchase them [referring to ALT] and then risk not getting a refund because they are not suitable” (Focus group 2).

Because cost can be such a prohibitory factor in ALT adoption, the Occupational Therapists interviewed felt a professional obligation to help clients navigate the ALTs available to find the most suitable and affordable device to meet their occupational need. For example, P3 stated:

“How people use and choose to spend their money, and I think certainly Occupational Therapists have a role in that you don’t want people to be spending money on expensive equipment that’s not going to meet their needs” (P3).

3. Time

Time was identified by the Occupational Therapists as a factor which greatly influenced their adoption of ALT. Participants identified significant time constraints as limiting their ability to increase their knowledge and be trained on available ALTs, appropriately assess their clients for ALTs, or train their patients on the use of ALTs once prescribed. Despite these time constraints, participants acknowledged the importance of taking the time for proper assessment and training to ensure client safety, independence, and occupational engagement. For example:

“We’re tenacious at getting what we need for patients, and finding a way, but its very time consuming. But important, because it can make the difference between someone being safe and not safe, managing and not managing at home” (P3).

“I might go and see them once. I don’t tend to go and see people twice. I don’t have time to go and coach them through this thing” [referring to ALT] (P8).

Time lag also became a constraint during the ALT prescription process. To be most effective, participants felt that ALTs should be introduced early in the rehabilitation process so that older adults could see their worth early on. However, participants also highlighted the lengthy process between the time of recommendation by the Occupational Therapist and set-up of the ALT in the home. For example:

“The referrals take so long. If you could phone someone and get a response or an answer within a short term, because often when you want this equipment...you want it straightaway” (Focus group 1).

From the Occupational Therapists interviewed, this time lag was partly explained by the lack of coordination of services and communication breakdowns between rehabilitation personnel and the ALT provider/installer. For example, Occupational Therapists frequently cited frustration when

the timing of delivery and installation of ALTs, which was often subcontracted to different companies, was unknown, thereby causing delays in discharge plans. This represents a distinct occupational justice issue, in that patient care may be compromised because of services being farmed out to third party organizations. Moving forward, the participants cited the need for better coordination within and between ALT services:

“The waiting list as well as a lack of communication between the referrer and the installer. We put the referral in and then we don’t know what happens. Whereas it would be good if whoever was installing it could refer back, [to] let us know” (Focus group 3).

4. Increased awareness, education and training

The Occupational Therapists identified two key areas for training, education, and awareness building including: (i) the current and future technology needs of older adults; and (ii) currently available ALT. Participants discussed the importance of accessing detailed, accurate, and objective information on available technologies and having protected time to enroll in ALT training. Indeed, enhanced education, awareness, and training are a necessary factor to increase successful uptake of ALT among older adults and enhance the perceptions and behaviors of Occupational Therapists towards ALT. For example:

“You don’t know what you don’t know. We [referring to Occupational Therapy practitioners] don’t know anything that’s new that’s coming out. We don’t know what’s new and what’s coming out. We need an update of new processes and services available” (Focus group 1).

“I think the barrier is the lack of knowledge and the lack of information about what is available and how it could help...To my embarrassment, one of the barriers might be having

a good understanding of what is available for people and where they can source it” (Focus group 3).

5. Usability

When considering the recommendation of ALT for older adult clients, the participants commented on the importance of key usability features being in place. Of the utmost concerns was whether the ALT met a 'felt need', meaning that the technology must be effective in meeting the needs of the user and the occupation for which it was originally prescribed. Additionally, ALT considered to work properly, reliably, and safely was more likely to be adopted whereas ALT that was perceived as unsafe, difficult to use/learn, impractical, awkward, uncomfortable, or that drew too much attention to the clients' disability was rejected. Too often, participants discussed their clients refraining from using ALT because of the stigma attached to its use. ALT became a 'symbol of disability' that marked their difference from their able-bodied peers (Polgar, 2006). Being marked with an outward sign of disability frequently caused older adults to fear being perceived as vulnerable, dependent, or as the required recipient of pity or charity. The Occupational Therapists interviewed, acknowledged these fears and the challenges that it posed when recommending ALTs. For example:

“A lot of equipment makes the person more visible of having the disability. There's a lot of time when people will say, please don't put grab rails on the outside of my house because then I'm visible and I'm vulnerable and I will be burglarized. There's a massive fear that some technologies make the person more visible” (Focus group 2).

“That's one of the main barriers that I feel we get is a patient's pride. “I don't need that”.

“I want to be independent, that's taking away my independence” (Focus group 2).

Because of their fear and the desire to project a self-image consistent with independence, older adults often rejected ALT and associated it with the 'other.' For example, one Occupational Therapist recalled a situation in which her client refused ALT stating:

“That’s not for me! That’s for people that are old and frail!” (Focus group 2)

The aesthetics of ALT was another influencing factor on whether technology adoption occurred. Given that older adults are concerned about the messages that use of ALT conveys, it is not surprising that they also prefer ALT that does not look “too medical.” In fact, many participants recalled their clients feeling embarrassed with the use of particular ALTs. For example, in speaking about a client’s poor use of her light writer [technology in which you type in words and the device speaks them aloud], one Occupational Therapist stated:

“I had to encourage her sometimes as well. She didn’t want to carry it around especially when taking it down to the lounge where there were other people; she was quite embarrassed about it” (Focus group 1).

Discussion

Many of the findings from this study, including affordability; time; and increased awareness, education, and training, confirm findings from previous research studies into barriers to technology adoption (Clark and McGee-Lennon, 2011; Lewin et al., 2010; Wherton et al., 2015). The remaining two findings, regarding establishing a positive client-therapist relationship and a client-centred focus on usability represent findings that speak to the distinct values of occupational therapy, wherein the clinician considers the value of ALT prescription given the client’s financial resources; occupational desires; needs, values, and preferences; and functional abilities.

The study pointed to an interesting finding as it relates to the aesthetic dimension of usability. Until recently, the design and development of many technologies geared towards older adults was largely driven by function, however, aesthetic factors (referring to the look, feel, size, and materials used) are emerging as an important dimension of usability. This was demonstrated in the current study wherein participants described older adults as rejecting technologies that were “too medicalized”. Rather, participants advocated for a ‘discrete’ or ‘unobtrusive’ aesthetic design. Aesthetics is clearly an important dimension of usability that has the potential to directly influence older adults’ decision-making regarding technology acquisition and use (Dove et al., submitted). Moving forward, Occupational Therapists must ensure that technologies are recommended for older adults in such a way that their needs, values, preferences and desire to portray a preferred identity are considered.

Findings from the study also point to the importance of attending to how ALT is defined. The study participants conveyed a narrow definition of what constitutes assistive living technology, referring mainly to electronic or battery-operated devices. In fact, only five of the 21 ALTs discussed included ‘traditional’ or non-electronic devices. This narrowed definition is not congruent with the definition adopted for this study by Cook and Polgar (2007) who referred to “any item, piece of equipment or product system whether acquired commercially off the shelf, modified, or customized that is used to increase, maintain or improve functional capabilities of individuals with disabilities” (5). The current findings suggest that as more digital devices become available, Occupational Therapists’ understanding of ALTs may become more limited. Moving forward, it is essential that Occupational Therapists continue to consider the full range of ALT, and not just electronic devices, that may benefit their older adult clients.

In addition to understanding the factors influencing Occupational Therapists' adoption of assisted living technology, what is also needed are solutions to increase ALT adoption and prescription, many of which were offered by our study participants. These solutions centered around cost-saving mechanisms, information-sharing, and feedback/evaluation.

Cost saving strategies

Given the high cost of ALT, participants recommended an online forum where clients could purchase used-technologies as well as exchange ALTs that no longer meet their needs. The availability of an exchange service is particularly important for those clients whose functional status is continuously evolving, and for which new ALTs are frequently required. In addition to an online ALT-platform, the study participants discussed the importance of a one-stop shop, where older adults could view and trial various ALTs in-person. This would help to partially address the time constraints experienced by Occupational Therapists by having all ALTs located centrally and would also enable clients to trial devices prior to purchase, thereby enhancing the likelihood that the ALT meets the occupational need for which it is purchased.

Information-sharing

There was a strong desire, on the part of the study participants, to increase training, education, and awareness building regarding ALTs. The study findings demonstrated that with no ALT 'champion' available to educate staff on the availability and use of technology, there was often a lack of uptake of more advanced technologies among Occupational Therapists. As such, the study participants recommended the allocation of an expert or 'champion' within each healthcare organization who would be tasked with the responsibility of updating colleagues on the 'latest and greatest' in ALT advancements. This champion would also deliver education and training to

healthcare providers on available ALTs, as well as act as a resource to answer questions for patients, their families, and members of the healthcare team. There is also a need for better communication of the online information-sharing platforms available, as participants were often unaware of the informative web-based ALT platforms available in their localities.

Feedback/evaluation

After prescribing ALTs, due to the lack of coordination of services and communication breakdowns, Occupational Therapists are often not aware of what their older adult clients think about the technology and if it has been supportive in enabling their occupational engagement. As such, study participants recommended follow-up with clients and their families using one-on-one interviews or surveys to determine how the ALT is working in practice; a recommendation supported by Clark and McGee-Lennon (2011).

It is important to acknowledge the methodological limitations of the study. First, the study participants all worked in the UK National Health Service which is free at the point of delivery, and it is possible that some of the issues identified are of limited applicability to Occupational Therapists working in different health care systems. Additionally, the sample size is small, with few areas of clinical practice represented: geriatric mental health, spinal cord injury, rheumatology, general medicine, and respiratory rehabilitation. Other areas where Occupational Therapists practice, including stroke and neurological rehabilitation as well as degenerative disorders, were not included in the sample, which may also limit the broader application of the study findings. Lastly, this study used a mixture of qualitative methods to explore the perceptions of Occupational Therapists. Some of the methods were new to this project and may not have been as effective as standard techniques. The confirmation of the three previously found themes (affordability, time,

and education, awareness and training), however, as well as the uncovering of two additional themes (positive client-therapist relationships and a client-centred focus on usability), suggest both that the study participants were representative of Occupational Therapists on the front line and that the interactive COBALT methods were successful at eliciting the participant's views.

Conclusion

With population aging and the increasing role that technology is playing globally in the lives of older adults, never has it been more important for Occupational Therapists to harness the potential of new, developing, and existing technologies to support people to live and age as well as possible. As a profession focused on enabling engagement in meaningful occupation, Occupational Therapists are tasked with the responsibility of promoting the adoption of ALT to ensure older adults engage in their desired occupations safely and independently. To do so, however, requires that Occupational Therapists are equipped with the tools necessary to offer their clients ALTs that are accessible, usable, and affordable.

Key Messages

- Affordability and usability were frequently cited barriers to technology adoption.
- Time and education/training influence the adoption of ALTs by Occupational Therapists.
- Positive client-therapist relationships support the adoption of ALTs by older adults.

What the study has added

This qualitative study has identified those underlying enabling factors necessary to support the adoption of assisted living technology by Occupational Therapists.

Acknowledgements: We are grateful to the occupational therapists who gave up their time to contribute to this study.

Research ethics: Ethical approval was obtained from the University of St. Andrews University Teaching and Research Ethics Committee (UTREC) in 2011. File #PS8241. All participants provided written informed consent.

Declaration of conflicting interest: The authors confirm that there is no conflict of interest.

Funding: This research was funded through the Technology Strategy Board. File #TS/10002010/1.

References

- Atwal A, Money A and Harvey M (2014) Occupational Therapists' views on using a virtual reality interior design application within the pre-discharge home visit process. *Journal of Medical Internet Research* 16(12): 283.
- Barnhart M and Peñaloza L (2013) Who are you calling old? Negotiating old age identity in the elderly consumption ensemble. *Journal of Consumer Research* 39(6): 1133-1153.
- Carspecken PF (1996) *Critical ethnography in educational research: A theoretical and practical guide*. New York: Routledge.
- Chen CC and Bode RK (2011) Factors influencing therapists' decision-making in the acceptance of new technology devices in stroke rehabilitation. *American Journal of Physical Medicine and Rehabilitation* 90(5): 415-425.
- Clark J and McGee-Lennon M (2011) A stakeholder-centered exploration of the current barriers to the uptake of home care technology in the UK. *Journal of Assistive Technologies* 5(1): 12-25.
- Cook AM and Miller Polgar J (2007) *Cook and Hussey's Principles of Assistive Technology*, (3rd ed.) St. Louis, MO: Elsevier.
- Coughlin JF, D'Ambrosio LA, Reimer B and Pratt MR (2007). Older adult perceptions of smart home technologies: Implications for research, policy and market innovations in healthcare. In: *Conference Proceedings of the IEEE Engineering in Medicine and Biology Society*, pp. 1810-1815.
- DiCicco-Bloom B and Crabtree BF (2006) The qualitative research interview. *Medical Education* 40(4): 314-321.

Dove E, McGrath C and Astell A (2017) The preservation of self-image: Understanding the technology adoption patterns of older adults. Manuscript submitted for publication.

Dreiseitl S and Binder M (2005) Do physicians value decision support? A look at the effect of decision support systems on physician opinion. *Artificial Intelligence in Medicine* 33(1): 25-30.

Ifinedo P (2012) Technology acceptance by health professionals in Canada: An analysis with a modified UTAUT model. In: *Proceedings of the 40th Hawaii International Conference on System Sciences*, pp. 2937-2946.

Jimison H, Gorman P, Woods S, Nygren P, Walker M, Norris S and Hersh W (2008) Barriers and drivers of health information technology use for the elderly, chronically ill, and underserved. *Evidence Reports/Technology Assessments* No. 175.

Kreuger RA and Casey MA (2000) *Focus Groups* (3rd edition). Thousand Oaks, CA: Sage.

Lewin D, Adshead S, Glennon B, Williamson B, Moore T, Damodaran L and Hansell P (2010). *Assisted living technologies for older and disabled people in 2030*. From: http://www.PLUMconsulting.co.uk/pdfs/PLUM_June2010_Assisted_living_technologies_for_older_and_disabled_people_in_2030.pdf

Office for National Statistics (2012) *Population ageing in the United Kingdom, its constituent countries, and the European Union*. From: www.ons.gov.uk

Polgar JM (2006) Assistive technology as an enabler to occupation: What's old is new again. *Canadian Journal of Occupational Therapy* 73(4): 199-204.

Rashidi P and Mihailidis A (2013) A survey on ambient-assisted living tools for older adults. *IEEE Journal of Biomedical and Health Informatics* 17(3): 579-590.

Riemer-Reiss ML and Wacker RR (2000) Factors associated with assistive technology discontinuance among individuals with disabilities. *Journal of Rehabilitation* 66(3): 44-50.

Schaper L and Pervan G (2004) A model of information and communication technology acceptance and utilisation by Occupational Therapists. *DSS2004 Conference Proceedings*, 734-744.

Schaper L and Pervan G (2007a) ICT and OTs: A model of information and communication technology acceptance and utilization by occupational therapists. *International Journal of Medical Informatics* 76S: 212-221.

Schaper L and Pervan G (2007b). ICT and OTs: A model of information and communication technology acceptance and utilization by occupational therapists (Part 2). *Studies in Health Technology and Informatics* 130: 91-101.

Schulz R, Wahl HW, Matthews JT, Dabbs ADV, Beach SR and Czaja SJ (2015) Advancing the aging and technology agenda in gerontology. *The Gerontologist* 55(5): 724-734.

Shah SGS and Robinson I (2006) User involvement in healthcare technology development and assessment: Structured literature review. *International Journal of Health Care Quality Assurance* 19(6): 500-515.

Spafford MM, Rudman DL, Leipert BD, Klinger L and Huot S (2010) When self-presentation trumps access: Why older adults with low vision go without low-vision services. *Journal of Applied Gerontology* 29(5): 279-602.

Venkatesh V, Morris MG, Davis GB, Davis FD (2003) User acceptance of information technology: Towards a unified view. *MIS Quarterly* 27(3): 425-478.

Weinberger M (2007) Population aging: A global overview. In: Robinson M (eds) *Global Health and Global Aging*. San Francisco: Jossey-Bass, pp. 15-30.

Wherton J, Sugarhood P, Procter R, Hinder S and Greenhalgh T (2015) Co-production in practice: How people with assisted living needs can help design and evolve technologies and services. *Implementation Science* 10(1): 75-84.

Wielandt T, Mckenna K, Tooth L and Strong J (2006) Factors that predict the post-discharge use of recommended assistive technology (AT). *Disability and Rehabilitation: Assistive Technology* 1(1-2): 29-40.