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## Well-being and HCI in later life - what matters?

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**Abstract.** As part of the Challenging Obstacles and Barriers to Assisted Living Technologies (COBALT) project, we developed the COBALT Tools for Engagement™, a number of innovative techniques to engage older people in all stages of technology development process. In the present study we used Technology Tours of the homes of eight older adults to look at their daily usage and examine the ways in which technology influences well-being. All of the participants use multiple technologies every day both inside the home and out. The data highlighted how technology contributes to well-being in a number of ways, including enabling them to maintain current activities; providing a means of staying in touch with families and friends; being easy to access and learn to use; and enhancing their lives. These can be divided into two types of factors: ones that relate to the direct outcomes of technology use and how these contribute to feelings of wellbeing and factors that relate to meeting an individual's needs, which if met contribute to their well-being. The findings indicate that well-being is a multi-faceted construct that includes autonomy, i.e. remaining independent, competence both in continuing to complete activities and learning new ones, and communication with other people. The study also indicates that Technology Tours provide an easily applicable and accessible means for enabling older adults to speak as 'experts' on technology.

**Keywords:** ageing • well-being \* technology • methods

## **1 Introduction**

Age is a major risk factor for many illnesses and with life expectancy increasing across all world regions [1] there is an urgent need to improve health and tackle age-related conditions. Since 1948 the World Health Organization has defined health as "...a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity". Therefore, improving understanding of well-being and ways to promote it is vital for developing new approaches to supporting the growing numbers of older people.

'Positive psychology' provides a context for studying well-being as it is concerned with the aspects and qualities that promote and provide a positive and meaningful existence – essentially the things that make life worth living. Positive psychology considers the human experience from the individual to the social group, highlighting the "valued subjective experiences [of] well-being, contentment and satisfaction (in the past); hope and optimism (for the future); and flow and happiness (in the present)" [2]. This approach recognises that people do not exist and operate in isolation and thus the satisfaction of an individual's needs occurs within the social context, acknowledging the importance of interaction and relationships with others in achieving this.

There is no reason to believe that satisfying our human needs for well-being, achievement, hope, etc., lessen as we age. Additionally, there is a strong preventive argument to be made for assisting and supporting people to keep experiencing a meaningful and fulfilling life for the benefits this can bring [3]. However, well-being is a complex concept to describe and measure. Like quality of life, well-being is largely subjective and a feeling of well-being arises in relation to many different aspects of a person's life. It is also a transient state, reflecting changes in health, wealth and social situation across the life-course [4]. Crucial for improving our measurement of well-being is the need to increase our understanding of what elements contribute to feelings of well-being in later life, how they can be characterized and why they are important.

### **1.1 COBALT project**

The COBALT (Challenging Obstacles and Barriers to Assisted Living Technologies) project set out to work with older adults across the UK to explore what factors, including well-being, influenced their decisions about technology adoption. To achieve these aims, partnerships were established with groups of older adults and a set of tools put together to extend data gathering beyond existing methods, such as focus groups. Building on previous projects working in partnership with older adults to create a digital conversation support [5] (REF), activity package [6] (REF) and multi-dimensional assessment tool [7] (REF), the COBALT team adopted an approach we term 'user as expert'. From this starting point we set out to identify ways to capture data from older adults about their existing technology use. This included reviewing existing methods used for exploring attitudes towards technology such as focus groups [8], and cultural probes [9].

The COBALT Tools for Engagement™ included an adapted version of Technology Tours [10], a method for documenting the range of devices a person uses in their

daily life, which we combined with a semi-structured interview to find out how participants came to choose and learn about the various technologies. During the tour we also looked for any adaptations they had made and probed the reasons why. Additionally, we also developed new interactive methods including “Show & Tell” and Technology Interaction” [11]. Of these COBALT tools, we found that Technology Tours and Show and Tell provided means of exploring well-being and here we report the findings from Technology Tours of eight older adults’ homes.

## **2 Method**

### **2.1 Participants**

Ethical approval was granted by the ethics committees of both the University of St Andrews and the University of Sheffield. The inclusion criteria specified that the participants should be native English speakers over age 65 years with no known cognitive impairment.

Eight participants, including two couples, aged between 76-82 years of age, were recruited for the Technology Tours of their homes. All participants lived in the community either in their own homes or in assisted living apartments. Two were wheelchair users and one used a walking frame and electric scooter. Informed consent to take part in the study and to be audio and video recorded was obtained from all participants.

### **2.2 COBALT approaches**

Technology Tours: We developed a two-stage process with a paper ‘technology log’ (Stage 1) followed by a one-on-one tour (Stage 2) of their home. The technology log was a blank paper log with space for the participant to write the time of usage, technology used and additional comments which was to be used by participants to record their technology use in a timely manner over a 24-hour period.

### **2.2 Procedure**

Six Technology Tours were conducted.

Stage 1. Participants were asked to list the technologies they used over a 24-hour period in the technology log. This was designed in table format with time slots of one hour to enter technology and to add comments when desired i.e. brand of technology.

Stage 2. Participants were asked to give the researcher a tour of technologies in their home. This lasted for one hour on average. The Technology Log was used as a starting point for the tours. During the tour the older adults were encouraged to explain the value and importance of the items in their life, including how they used them, why they were acquired, whether they were self-purchases or gifts, and what they liked and disliked about each item.

All sessions were video or audio recorded and these were transcribed and analysed using nVivo 9 software.

### 3 Results

During the Technology Tours the older adults highlighted how technology contributed to well-being in a number of ways. These included 1) enabling them to maintain current activities, such as cooking or shopping or hobbies; 2) providing a means of staying in touch with families and friends; 3) being easy to access and learn to use and often an improvement over older items; and 4) enhancing their lives as solutions, such as e-readers or low vision aids, or offering new opportunities, such as Internet surfing and email. In addition, self-identity appeared as a factor that interacted with well-being, particularly in relation to how older adult's view themselves as potential users of technology and how their technology use is viewed by other people.

#### 1. Maintaining current activities

This 78-year old lady described how her different mobility aids assisted her to keep going out and about:

**I: "I'm just going to ask you how you came to own your electric wheelchair, your normal wheelchair and your scooter."**

AC: "Well the normal, this one's not mine, this is the NHS issue. I've had one for, I suppose about 15 years now. I had it before I came to live in S... Then I bought a scooter for getting round and going out, because I'm heavy. I was a lot heavier when I bought it. Pushing me is not easy so I bought a scooter so I could get around better. And the indoor one, I just thought I'd like one, because even for me in a place like this (extra care housing), up and down the corridors, it's heavy work on the carpet, so I found the electric one gets me about nicely." (Lines 625-633).

#### 2. Staying in touch

In the Technology Tours, seven participants used a mobile and the eighth owned one but had reverted to the landline as they went away from home less often. Going through their Technology Tour Log, this couple (T&J) described their use of the computer for social media:

T: "You look at Facebook."

J: "Oh, I was looking at Facebook last night with the children and the grandchildren, keeping in touch with what's going off there. Catch up with all of that." (lines 357-360).

Later in the Technology Tour interview J described the usefulness of her mobile phone:

J: "...then my other daughter, er granddaughter, she's teaching at C... (neighbouring town), and I go swimming with her and she, I'll get a text, "Grandma, want to go to, want to go swimming tomorrow, the day after, such-and-such a time?" Then I'll just send "yes, okay", and that saves a lot of trouble, doesn't it, and so. That's it to keep in touch with everybody, and my friend, I might just send: "Do you want to come up for a meal in the evening?" (Lines 1141-1145).

In addition to staying in touch and simplicity, another participant noted among the benefits that having a mobile phone gave her a sense of security but also how it had become a part of her life:

**Interviewer: "What made you buy a mobile phone, why did you want one?"**

Mrs C: "Getting stuck on dark roads at night"

**I: "Had that happened to you?"**

Mrs C: "No, but I used to baby-sit for my family when they were up at K..., and I'd be coming back midnight or something, along the dark roads, and kept thinking it would be nice to be able to, in case of breakdown. I think you'll find a lot of us oldies get one for when we're travelling. So it began from that, and then I used to only use it when I went, took it out in the car. Now I keep it on all the time so my use has changed, and it goes everywhere with me."

**I: "So has it become more important to you as the time's gone on?"**

Mrs C: "Yes, yes."

**I: "But how do you think that happened?"**

Mrs C: "Familiarity with it, usage, and its general usefulness really. But it's not as useful as one of those [indicating interviewer's smartphone], obviously, but just having it with you, it gives you a sense of security I suppose, that's really what it comes down to."

**I: "Yeah, and when you started using it a bit more, was it for things like texting and ..."**

Mrs C: "Yes, and also if I'm meeting people. That's often where it, somebody can be standing in the wrong place, and that's when you can link up. It's, getting my older friends, we all have them now, or most of us do, and it's if your train has broken down or anything like that, and you've got an appointment, that's when I think we switch on

our mobiles, and as I say, I have mine on all the time, but some people don't, and if they're meeting you they'll put their mobile on and, yeah, just general helpfulness." (Lines 160-189)

### 3. Easy to access

This participant explained that she enjoyed watching television and had two in the house. Here she describes the process of acquiring her new television and Freeview box. Freeview is the UK's digital terrestrial television platform which requires a 'tuner' (either built in or as a set-top box) to view.

**I: So I see you have a got a grey television there, a silver television, is that a Freeview box you have got?**

Mrs A: Oh it is a Freeview, it is yeah.

**I: Did you buy that yourself?**

Mrs. A: "Let me think now, oh I think I approached my son in law. And he looked on his computer and decided that it was a good thing to go to a certain shop in town, so I went on my own, saw the one that I wanted and the size and everything. They delivered it".

Figure 1. Large button calculator to overcome problems with fine motor movements.



This gentleman (L) who had developed an essential tremor which reduced his ability to use a mouse and keyboard, used a large button calculator (Figure 1) and had recently acquired speech to text software. Here his wife (M) describes the process of getting it up and running:

**I: [You've] been trying to use this software for just a couple of weeks now, isn't it? So I'm just about to see a sample.**

F: It's getting the enunciation correct, which is a problem.

**I: I see, right**

F: So if you run words together you get a real jumble

*(Laughter)*

**I: But you have to train it, don't you?**

M: Yes.

This 78-year old lady uses multiple technologies and keeps her pill box by the toaster as a reminder (Figure 2).

describes how she updated her devices over the years, moving from a typewriter to a word processor

**I: Do you remember why you got one in the first place, what you wanted it for?**

Mrs C: "Well, it was a word processor I wanted first, definitely. Because I was a secretary so, gradually I've gone from the old original Remingtons, from the manual to the electric, to what was the next stage up and then a computer, so I've gone through the whole process."

**I: So do you think, am I right in thinking you were working when you got your first one?**

Mrs C: "No, because I've been retired quite a few years now. No I would think it was after, afterwards."

**I: So were you using it to produce documents for**

Mrs C: "I think I just had a word processor, and then graduated to a proper computer and a server. I think."

**I: So did you move onto email and things after that?**

Mrs C: "Yes."

**I: So how would you say your usage of your PC's changed over the years?**

Mrs C: "Well I've learned the basics of, I can email, I can now research, I can get on the internet, I can order stuff from Amazon, I can tinker around to that extent. I can print off something, if somebody puts a photograph on it I can get a copy. But that it is just about as far as I go with it." (lines 294-321).

Figure 2: Mrs C's pillbox kept by the toaster.



#### 4. Life enhancing

This 78- year old lady describes how she acquired her Kindle and the features she appreciates:

**I: How did you come to own it?**

AC: “I’d seen it advertised on TV and thought, that sounds like a good idea, because I’ve always been a big reader, and I’d had mountains and mountains of books, which I’ve now got rid of. And they’re expensive, and getting them onto Kindle the most you pay is a fiver, so it appealed to me. So I got the girls to look on the Internet because there are several different ones, and I thought Kindle sounded, and I like Amazon, I think they’re good, so that’s why I got it.”

**I: I know you use it for reading, do you use any of the larger fonts?**

AC: “Yes. I’ve got it on a large font at the moment because my eyes have been so bad, but I’ll get Kath to get a smaller font now I don’t need it quite so big. But I’ll wait till I’ve got my new glasses and see how I cope then.” (Lines 325-338).

Finally, this couple sum up the reasons they search for and acquire new technologies:

“Well, we suddenly realised when we retired, I didn’t retire until I was over 70, I was just 70 and a half when I stopped work, and then we started buying all things that we realised that we need now that we’re older. It suddenly dawned on us, and we started buying things to make life easier”. (Tim & Jean, Lines 1223 – 1225)

#### 4 Discussion

Technology Tours are an approach to capturing detailed information older adults' currently use of technology. We adapted this existing approach by combining a Log with a semi-structured interview. The eight participants all utilized a range of technologies in their daily lives that they demonstrated to the researcher. These included many everyday items including kettles, showers, stoves, washing machines, and televisions. Most of the items they used were self-purchases or gifts, with many instances of people researching the items before purchasing, to get the best features or price.

Two of the participants who had physical challenges had both purchased items to enhance their well-being and also made adaptations. For example, one lady who lived in extra care accommodation used an electric scooter and electric wheelchair, both of which she purchased herself. She had also adapted her wheelchair by putting marker pens in the arms so it can hold her shopping bags. She said it is difficult to use on carpets so she purchased an indoor scooter online with the help of her daughter and regards this is a luxury. She also purchased her outdoor electric scooter online. She said this was a key purchase for keeping her independence. An older gentleman with essential tremor had purchased technology to overcome his problem with typing and a large button calculator to assist in calculations as he was no longer able to make fine motor movements.

The technology log was found to act as a memory aid for participants both in terms of filling it in and as a prompt for the Tour. It also helped to assess which types of technology are of interest and to focus on these in the technology tour. The tours enabled the COBALT team to see technology in context, see technology in use, see any modifications made to the home, and use the technological objects as a visual prompt for conversation.

The findings highlight that well-being is as important in later life as at any other time. As the participants went around their homes and talked through how they spent their days, they gave many examples of how technology impacted on their well-being. From a positive psychology perspective, the participants selected and used technologies to enable them to keep doing activities that are important to them, help them keep in touch with family and friends, are easy to use or an improvement on existing devices and generally enhance their lives.

The factors that contribute to well-being fall into two groups: Those relating to the direct outcomes of technology use, i.e. enabling continued activities, participation and socialization and how these contribute to feelings of wellbeing. The second set refer to indirect factors such as technology use meeting needs for competence and autonomy, which along with connectedness (i.e. being in contact with others) have been proposed as the three basic human needs [Together, these findings enhance our understanding of the multiplicity of factors that produce feelings of wellbeing in older adults using technology. These could be used as the basis for developing comprehensive approaches to sensitively elucidate, describe and measure the impact of HCI on wellbeing in later life.

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