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CO-DESIGNING APPEALING WEARABLES WITH CARE HOME RESIDENTS

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ABSTRACT

Increasingly, wearable technology is being used to garner information about our health, lifestyle and general wellbeing, potentially offering valuable insight and analysis of our physical capabilities, needs and health requirements. Though designed to fit on our bodies and around our personal routines, these wearable devices are more often created to suit the lifestyle and needs of younger, more active and tech savvy users. Older users have expressed dissatisfaction with these devices, finding them to be aesthetically unappealing or ill-fitting. Furthermore, some older users find their lack of understanding of technology and its' means to be a barrier for using wearable technologies.

This paper discusses a set of co-design workshops where older adults living in care homes were invited to design their own wearables. The research contributes to BESiDE, a collaborative project from University of Dundee and Newcastle University that aims to inform the design of better, more enabling built care environments by utilising wearable location based and accelerometer technologies to gather information regarding the way people engage with spaces.

The co-design process facilitated empathy and understanding of initial preferences and design requirements for wearable technologies to be used in care homes. The craft-focused design activities created value for both residents and designers, enabling new conversations and deeper insight and understanding of residents' real-life experiences, ideas and skills.

Keywords: co-design, value, wearable technology, wellbeing, care home, craft

1 INTRODUCTION

This paper reports on a set of co-design workshops that place the human element at the forefront of the design process offering older adults the opportunity to be designers of their own wearables, ensuring that developing designs are meaningful, useful and usable. The workshops contribute to BESiDE Research (Built Environment for Social Inclusion through the Digital Economy), a multi-disciplinary project from the Universities of Dundee and Newcastle that aims to inform the design of more enabling built care environments that promote greater mobility, physical activity and social connectedness thus improving residents' wellbeing. Using wearable sensors, a key project objective is to understand how well older adults living in care homes currently navigate and use their home spaces.

Taking a craft rather than technology focus, co-design workshops driven by a creative and empathic approach were conducted to generate captivating objects

with users that will house the sensors and fit easily into daily care home life. The workshops were also used to facilitate conversations to enhance understanding of the technology being used and any future design implications. This inclusive approach not only encouraged empathy between designer and user but also created the opportunity for more positive engagement with digital devices for users. Indeed, as Coombes et al (2013) counsel, listening and understanding is essential to the development of empathy and therefore the discovery of important insights for design research.

In this paper we report on our findings and how our co-design approach contributes to the empathy of older adults in care homes in the context of designing appealing wearables for them.

2 CARE HOMES, CO-DESIGN AND CRAFT

This study, with a focus particularly on care home residents, aims to explore the value co-design and empathy can bring to the design of appropriate and appealing wearables for older adults. This is crucial as various studies such as those by Hocking (1999) and Leger and McCaffery (2014) have suggested that between 50% and 56% of wearables and assistive technologies respectively are abandoned by older or vulnerable adults and 15% are never used.

New research suggests that finding innovative and user-centric ways of 'disguising' technology can combat barriers for engagement. Digital technologies think-tank, Endeavour Partners cite Withings' Activité watch (an activity and sleep monitoring device fashioned like a gentleman's standard watch) as an effective example (Ledger & McCaffrey 2014) and Care Predict, assistive technology specialists, incorporate wearable tracking systems into stylish beaded bracelets in response to users' design drawings (Rojahn 2014). Lack of understanding of technology can also contribute to low levels of engagement particularly in the context of care home life as digital devices are often considered to be inappropriate or unnecessary (Dykes, 2013). Sensory, cognitive, communication and generational issues may also further impede understanding of technology. Indeed, as Lim (2010) advises, the effects of cognitive changes in aging in different birth cohorts, impact on the way people interact with and understand products.

Creating attractive wearables for our oldest generations with little user input can be difficult as there may be a tendency to make assumptions and trade aesthetic appeal for practicality (Newell et al. 2010) Indeed, digital artefacts should avoid stigma from being medical in appearance and instead enforce a positive identity through the use of familiar materials (Dykes et al. 2013). Personalisation and craft therefore, can be key to ensuring wearability and adoption not only in terms of taste and style but also with regards to fit and comfort. And in the case of this population, co-designing using craft can enable feelings of greater physical capability and increased confidence and connectedness with their care home community. This approach is supported by Dykes et. al (2013) who suggest that as care home life is often associated with disempowerment it is valuable to augment resident's existing abilities, knowledge and experiences. And as Bernadbei and Power (2013) state: "(When) an end-user is intimately involved with part of the production process… the emotional bond formed is arguably greater". Mugge et al. (2009) elaborate on this to state that "The personalisation process requires the investment of a great deal of effort, the person is occupied with the product for an extended period of time… (This)

allows end-users to alter or add features to the product in order to best suit their needs and desires… As a result of this design personalisation, the end-user can identify the product as their own."

However, sensitive issues can arise in introducing new technologies into a person's life or in communities such as a care homes as there is an ethical obligation to understand the social acceptability of products and systems including any stigma, barriers to adoption and issues relating to unfamiliarity or fear of digital technologies. As designers working in this field, we have a responsibility to look at wider issues pertaining to the relationships between people, products and the ensuing effects on the concept of wellbeing, including interaction qualities such as pleasure and aesthetics. Engaging residents in craft and shared making activities can be an effective way of creating a relaxed and open environment; it is very natural to sit quietly whilst working on a craft project so conversation may develop in a non-linear way. White et. al (2012) promote activity such as this in their work with Children's Hospice Association Scotland - where they created simple handcrafted cushions tagged with RFID technology to enable young people with complex communication needs to easily access their favourite sites on the internet – stating that "shared activity elicits conversation and engenders trust" and the simple crafted objects created were engaging, insightful and valuable to a care environment where staff may not have the time or skills to engage with complex new technologies.

3 APPROACH AND METHODS

Our design approach was informed by initial informal visits to participating care homes whereby we learned the varied and significant cognitive and communication issues that may hamper the resident group's engagement with the co-design process. One carer commented that "maybe 90%" of the residents suffered some degree of cognitive difficulty and that they may struggle to remain engaged during craft or design activities. When designing with vulnerable people, researchers must create approaches to participation that are sensitive to any potential risks, stigmatization or challenges for participants throughout the process (Vines et. al 2013).

Empathic design is essential to this study in order to create successful wearable designs that are appropriate for use within care homes. McDonagh (2006) defines empathy as "the intuitive ability to identify with other people's thoughts and feelings – their motivations, emotional and mental models, priorities, preferences and inner conflicts." This level of understanding is invaluable to the design process but comes with its challenges. Kimbell (2013) defines the challenges for empathy in design by differentiating between 'cognitive empathy' - putting oneself in the users shoes and 'affective empathy', where the designer themselves feels the same emotions as the user. Kimbell counsels against the second approach as this risks becoming so tied up in feeling the emotions that one loses sight of the interpretation and analysis. We would argue that by taking a co-design approach, the designer steps into the shoes of the user for a deeper understanding -both cognitively and affectively- then steps out again for competent action.

Kouprie and Visser (2009) suggest a framework for empathic design as such; Discovery of user's situation and experience through initial conversation; Immersion in the user's world through active observation; Connection with the user by achieving emotional resonance and finding personal meaning; and

Detachment from the user in returning to the role of designer and sense maker. In engaging and reflecting upon the design process using this framework, we, as designers are able to be more explicit in the steps or tools that were required by individual participants as well as which techniques might aid them in developing their thoughts and ideas for design solutions. Kouprie and Visser (2009) define the 'Immersion' phase as the most important but most overlooked within this framework, as it is often not directly solution focused. Indeed, whilst working responsively with residents we often learned more about residents' lives before they entered the care home but in 'wandering around' the residents' experiences, we become open minded and absorb the various aspects of their world. For example, one resident described for us the sights and sounds of his youth – singing 'Danny Boy' and playing football in the streets with his friends, the women in his neighbourhood singing on their way to and from 'the steamie' (a public washhouse) and the 'socials' or tea dances that took place on a Saturday night in the local community hall. Whilst these stories may not directly influence the design of our project wearables, they do help us to understand the residents' sources of influence and inspiration.

Wright and McCarthy (2008) proposed three qualities that are central to empathic design approaches: (i) a quality relationship between the designer and the user that allows the designer to be attuned to the user's needs; (ii) a sympathetic disposition towards the other person; and, (iii) an attention to the affective and emotional quality of their experiences. Taking into account these qualities, issues (such as adoption, understanding of technology, aesthetics and wearability) and recommendations (co-designing using craft and being sensitive to any potential risks, stigmatization or challenges faced by participants) revealed through literature review, we devised an approach (Figure 1) that would enable designers and researchers to empathise with their stakeholders and engage users in creative experiences where participants use familiar skills and materials to design wearables.

In order to discover meaningful insights the designers ran a progressive series of design activities (Figure 1) focused on craft ideas and aesthetics that were responsive to each individual care homes' needs (Lim & Nevay 2014). Working collaboratively with care home and activities staff enabled the designers to anticipate engagement levels, understanding and even optimum times to visit and conduct activities to suit residents' routines.

To first understand the types of preferred creative activities, making skills and abilities of the residents, the researchers met informally with staff, residents and visitors over tea. These relaxed conversations enabled the researchers to determine residents' interest in participating and also give us a better understanding of their experiences, personalities and capabilities. Informal arts and crafts sessions were then designed specifically for each home to allow residents and researchers to get to know one another better.

Ten residents in total, identified with staff as being fully cognitively able and happy to participate, joined us for these activities. During these sessions we introduced our intended design process, design methods, crafting materials and prototype sensors (Figure 2). The design process was explained to the residents with the aid of a pictorial booklet and a set of bespoke design tools. This included activity sheets, mood boards and a picture card deck depicting different wearable objects and fastenings. These tools acted as visual prompts for participants who, with some support were able to define initial design

requirements to suit their unique needs in terms of fit, comfort, style, acceptability and expectation. After the informal craft sessions, co-design activities were introduced to residents who were interested and able to explore the development of wearables more fully. In using this approach (Figure. 1) trust and understanding can be established between research teams and residents, enabling both parties to get to know each other more effectively. This can reveal a range of insights and latent needs that may not be uncovered otherwise.

Figure 1 Co-design approach used in conducting design research in care homes

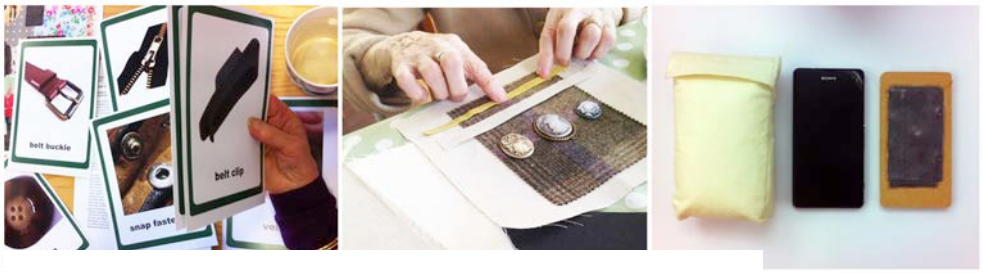

Figure 2 Design tools and methods to support residents

Throughout the activity process we recorded observations and conversations and upon transcribing the data after each event, we performed a thematic analysis. In our findings, we discuss three broad themes on how our approach contributed to the development of empathy with the older participants we were working with. The themes were 1) recognising life experiences and knowledge 2) recognising design opportunity and ideas and 3) recognising independence and skills.

4.1 RECOGNISING LIFE EXPERIENCES AND KNOWLEDGE

While expressing their creativity during craft activities, participants often related both their past and present experiences, giving us insights into the context of their creations. This enabled us to understand preferences, needs and requirements of each individual. One of our craft activities invited residents to create textured 'pictures' and experiment with a range of different coloured, textured and patterned fabric swatches and materials. Aided by the designers, participants constructed their art pieces, which were then framed in embroidery hoops and hung on the care home Activities Board as a mini exhibition (Figure 3). These art pieces could also be appropriated into pouches or carriers if preferred. One resident told us, "The first thing that draws you in is colour and the feel of it". She went on to tell of her time spent working in a textile factory making clothing and shoes in response to a button she had found that reminded her of the colours of felt she used to work with.

Figure 3 Informal craft activity: making textured pictures.

Another resident, relating to the project's core issue of enabling physical activity due to his own experience of deteriorated strength and mobility, suggested that he wouldn't like to wear a wearable as he has to use a walking frame and fears that this might further impede his movement. Rather, he would happily carry it in his walking frame bag that he already utilizes to carry newspapers, his spectacles case and other 'bits and bobs'.

He was shown a range of sample fabrics, embellishment materials and fastenings to enable him to begin to put together a prototype of his wearable. In response to sorting through a set of tartan swatches, he subsequently told us stories from during his time in the Royal Navy and his later employment in the textile industry. The samples shown reminded him of his regiment and he revealed that he would feel a great sense of pride to wear his tartan again,

intimating that he felt he would have reason and opportunity to share stories from this time in his life if others around him saw him with the tartan. (Figure 4)

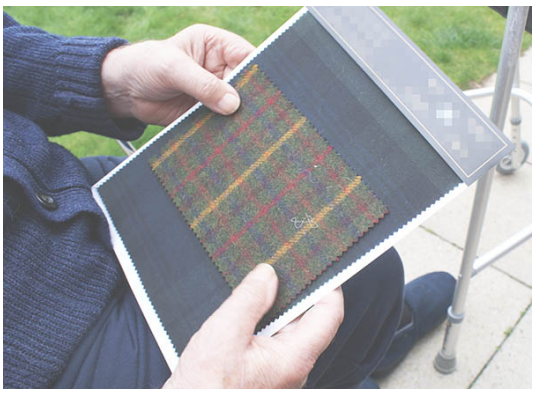

Figure 4 Resident discusses his fabric choices

The storytelling that was facilitated by these activities allows us as designers to understand more deeply, the issues, needs and concerns of our users that should be considered within the design process; this participant is motivated to take part in the research study to reinvigorate part of his 'lost' personhood. This insight highlights the layers of reason for his engagement with this particular study. Storytelling also helps us to generate ideas and explore ethical or practical issues (Fairbairn 2002). Our co-design process on the whole creates several outcomes of value for participants – personalised design creations, new conversations, connections and the opportunity to be involved in informing positive change in an area where they are 'experts of their own experiences'. And the designers, whilst engaged in an empathic process of practice, may gain invaluable insights by identifying and supporting these needs.

Throughout the craft activities, residents, staff and visitors offered insights as to the appropriateness and social acceptability of different design concepts. For example, whilst carers suggested that materials that repelled water and can be wiped clean would be optimum, residents gravitated towards 'ordinary' materials (such as cotton and wool), as these are familiar and already part of 'everyday wardrobes'. Indeed, another resident in response to a high performance mesh fabric fashioned as a wristband told us, "You'd look like you'd hurt yourself with something like that on. It reminds me of a bandage." (Figure 5) Using an activity sheet entitled, 'In my wardrobe', she gave examples of 'normal' clothing and materials; 'light layers', 'no big, fussy prints', 'warm colours', and 'nothing too showy or flash' stating that "not everyone has the same, I wouldn't like to parade around and make someone feel like they didn't have something as nice". In response to this concern, a visitor suggested that similarly designed 'base' objects (such as brooches or pouches) could be created with a group of residents and personalised simply with different motifs, buttons or badges to distinguish individuals within the group.

Figure 5 Resident tries on mesh wristband.

Another resident, whilst looking over the mood boards and picture cards said, “We’re too old for fashion. Perhaps you should talk to younger people”. This resident’s comments reveal a sense of apathy towards new wearable objects and one of her carers shared that residents can become disengaged with making new choices about clothing and wearable accessories because their daily options are limited due to lack of storage/wardrobe space and laundry routines. This learning can be seen to support an approach to augment residents’ existing clothing and accessories to incorporate technology rather than designing a new or commercial style wearable.

This kind of rich information allows us an understanding of residents’ life stories and will inform style choices for wearable carriers as well as practical factors. We learned that in order to meet the needs of the wearer, the carriers must be easy to put on and take off, engaging- to promote use, preserve dignity and be comfortable to wear.

An emerging theme within the researchers’ work with residents’ is reciprocity; “Reciprocity is a norm underpinning social relationships. Users want an equal relationship needing to believe their input is useful, wanting to give and not be ‘done to’” (Dee & Hanson 2014). The older adults we have encountered, especially those with cognitive difficulty or an initial lack of interest in the research or design activity, often expect or need more relationship reciprocity to first establish trust and understanding before imparting their knowledge and personal stories. Due to the constant distractions caused by other activities in the care home environment as well as days where residents do not feel ‘up for it’, researchers have to gauge opportune moments to create positive future-forward conversations and ideation. To achieve this, the researchers embed themselves within familiar daily activity such as teatime prior to introduce any design tools or activities and by being responsive to the needs of the residents.

4.2 RECOGNISING DESIGN OPPORTUNITY AND IDEAS

Our visits have revealed that it is important for wearables to be humanised to fit into residents’ daily lives. For example, during an informal visit, one resident showed us a handmade bag for her walking frame that her sister had gifted her from a craft faire (Figure 6). Though she had not been engaged in the making of the bag, she said she liked the ‘crafty’ style and that it had been made from lots of different scraps of fabrics. She also said it was “handy with lots of pockets - you could fit a phone in here. I carry tissues and things in it usually. I don’t need

much but it's pretty too." Another resident told us she would be reluctant to wear something in addition to her usual accessories (watch and jewellery) but thought it would be a good idea to have the option to customise a pouch for the technology and carry this in her handbag; "I carry all of the essentials in my handbag. I have had it for many years now." She also showed us her spectacle case, (Figure 7) which she carries with her in her bag; "I like it because I have always been attracted to a good red and it is a good size. Something modeled on this would be agreeable to me." She sorted through fabric swatches that would 'fit well' with the style of her spectacle case settling on a red wool and beige dogtooth fabric, commenting that these were "Nice and classic. Anything too bold is not for me." Referencing these objects which are already useful and part of their everyday lives, these residents defined for us, their perceptions of what would be acceptable and how wearing a wearable would work for them at home.

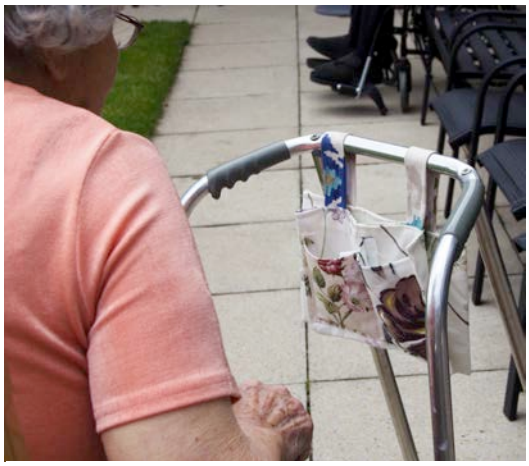

Figure 6 Resident's handmade walker bag

Figure 7 Resident shows her spectacles case and choice of colours and fabrics

Design choices informed by residents' real life experiences of living in a care home combined with the craft activities also helped to stimulate different discussions, interactions and group dynamics as residents who would not normally talk to one another, worked together to build collections of materials. As Etgar (2014) discussed, users desire to be involved in meaningful activities and make valuable contributions to their social groups. One carer commented; "It is exciting to observe the various benefits that craft and design activities can have for this population." Triggered by the tactile objects, participants shared and applied their personal understanding and experience to the creative activities and discussion. And by observing the resident's interactions with the various materials and other group members, the researchers were able to glean potential design priorities for future wearable sensor carriers in terms of fabric and aesthetic preferences.

Engaging in a process such as this creates value for the user in an environment that (whilst catering effectively to residents' consumptive needs) does not always satisfy or support creativity, experimentation and play (Sanders & Simons 2009). Generating such value for users can be of benefit to the overall design process improving engagement and creating "products that are more desirable and may therefore be retained longer and better suited to (users') needs."(Bernabei & Power 2013)

4.3 RECOGNISING INDEPENDENCE AND SKILLS

To encourage a sense of empowerment for participating residents, the designers created a session centred upon residents own skills and inspirations. Residents were invited to the session in advance by cards in the post. These invitation cards described the intention of the design activity and suggested that residents might like to bring 'inspirational objects' with them to begin their ideation. A small group of residents took part in this session, bringing holiday t-shirts, photographs and paintings they had made as their inspiration. The designers used activity sheets to gather notes about the things that inspired the residents, things that they value and any skills and hobbies that might contribute to the function, style or aesthetic of their wearable. Incorporating residents' personal items into the design process in this way helped create a good rapport and encouraged confidence in the group discussion as they shared stories about their lives, families and hobbies.

Working responsively to each care home enabled the researchers to gain insight into the varied level of activity individual residents undertake each day; some have firm routines, activities and hobbies that they follow whereas a select few rarely leave their bedrooms. The researchers' approach needed to be mindful of the fact that there are limits to what care home residents are prepared to commit to outwith their norm. For example, two very active and engaged residents were happy to briefly chat to the researchers during an informal visit and critique some prototypes, offering suggestions for improvements or indeed, rejecting some designs altogether but were not interested in committing to a fuller crafting activity due to other scheduled activity that day.

The activities also challenged the researchers understanding of some care home residents' abilities in terms of independently constructing and using wearable accessories. For example, one resident, prompted by conversation over a set of old buttons from around the world took off his watch to show us he bought it in Japan whilst travelling with the Merchant Navy in his youth. With this everyday

gesture, the designers were able to observe fine motor skills and understand a great level of dexterity. This challenged our perception of his abilities to independently put on and take off a wrist worn carrier without requiring help.

5 CONCLUSION

In this paper we have described how a co-design approach can facilitate empathy and that empathic design is important to the creation of successful technological products for older adults. As guides throughout the design process the designers were able to achieve empathy with their stakeholders and define initial design requirements for wearables by combining an understanding of the stories shared by residents and observations of their interactions with the developing prototypes. Empathic co-design also ensures that the functional as well as the emotional needs of the users are met. We achieved this by introducing a progressive set of creative activities to engage, understand and apply the experience of care home residents to the ideation and prototyping of desirable designs with and for them. Our empathic design approach is similar to the framework as outlined by Kouprie and Visser (2009) in that the application of our methods and design tools were responsive to the needs of our users and that we invest much time in the Immersion phase to the benefit of increasing our understanding of the various aspects and influences on our user's world.

These co-design investigations have set the scene for the discovery of not only the needs but the nuances of care home residents. The use of design tools, such as the picture card deck and latterly, the low fidelity fabric prototypes, acted as prompts to further explore design opportunities for potential wearable sensor carriers. The cultivation and encouragement of all of this knowledge contributes to the user's positive experience of the overall design journey and the creation of successful and relevant crafted objects.

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Co-designing Appealing Wearables with Care Home Residents

Sara Nevay, Christopher S.C. Lim

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