DESIGNING AN INTERGENERATIONAL INTERVENTION TO PROMOTE PHYSICAL ACTIVITY AMONGST OLDER ADULTS AND YOUNG CHILDREN

ROXANNE LEITÃO
C3RI, SHEFFIELD HALLAM UNIVERSITY
R.LEITAO@SHU.AC.UK

HEATH REED
C3RI, SHEFFIELD HALLAM UNIVERSITY
H.REED@SHU.AC.UK

ABSTRACT

We report on a series of co-design workshops conducted with older adults where we explored motivations and barriers to physical exercise in the contexts of social interactions, intergenerational family relationships and local communities.

Given the current state-of-the-art and knowledge gathered from our workshops with older adults, we further developed a concept prototype called iStep (Intergenerational Support To Encourage Physical Activity). iStep aims to promote physical activity by allowing children and their grandparents to form teams of two and collaboratively work toward physical activity-related goals.

This article presents findings of a series of co-design workshops that lead to the creation of iStep, as well as a pilot implementation of the concept in a primary school setting.

INTRODUCTION

Physical activity (PA) has been found to provide a wide range of benefits for an ageing population, including improvements in blood pressure, diabetes, osteoarthritis osteoporosis, and cognitive function, as well as being associated with decreases in mortality, age-related morbidity, and mental disorders in older adults (Hamer

1

& Chida, 2009; Nied & Franklin, 2002). However, evidence suggests that adults are not active enough to experience these benefits (Fox et al., 2011; Hallal et al., 2012) and that levels of inactivity increase with older age (Scholes & Mindell, 2013a). Data shows that worldwide an average of 31.1% of adults are physically inactive and that figure rises to 34.8% in Europe and 43.3% in the Americas (Hallal et al., 2012). Similarly, levels of physical activity are less than ideal in the younger population, with current levels being insufficient amongst young children (Scholes & Mindell, 2013b) and evidence suggesting that they decline even further with adolescence (Basterfield et al., 2011; Hallal et al., 2012).

The work described in this paper forms part of a EU-funded initiative called Innovage, with a number of projects and goals aimed at developing and testing, as well as surveying and cataloguing, social innovations that will have an impact on improving quality of life and well-being of older people. The project considers that with an increasingly aging population, improving obesity related outcomes in older age will impact positively on the health and wealth of member states. Specifically, the work-package that this project falls within specifies three aspects to consider when designing a social innovation to improve well-being in older age: 1) social interactions 2) intergenerational behaviours and 3) increasing levels of physical activity.

As defined by the European Union (EU) *"Social innovations are innovations that are social in both their ends and their means – new ideas (products, services and models) that simultaneously meet social needs (more effectively than alternatives) and create new social relationships or collaborations. They are innovations that are not only good for society but also enhance society's capacity to act. Social innovations take place across boundaries between the public sector,*

the private sector, the third sector and the household"(European Commission).

Design has become increasingly involved in social innovation over the last few years (Badke-Schaub et al., 2011), gaining traction all over the world with the objective of tackling societal and economical challenges related to public services such as healthcare (Cottam & Leadbeater, 2004), ageing (Jarrett, 2010) and physical activity (Design Council). Co-design provides a methodological framework in the design of social innovations, and refers to the process of including stakeholders throughout the phases of 1) problem-understanding, 2) decision-making and 3) creativity when developing a new product or service. It rests on a crucial understanding that each stakeholder is an expert in their own experience (Sanders & Stappers, 2008) and that all opinions, be those of designers, end-users or any other stakeholder, are equally important to the design process. Co-design is based on the belief that everyone can be creative given the appropriate tools and that one of the roles of the designer is to provide non-designers with the tools and techniques that enable design-thinking.

There are varying perspectives regarding design and designers' roles within the context of social innovation (Thorpe & Gamman, 2011). For the purpose of this work we have embraced the concept of socially 'responsive' design. Thorpe and Gamman (2011) argue that because the co-design process involves a series of stakeholders, it is subject to compromises regarding the negotiation of collective goals and the constraints imposed by context, community, resources and sustainability. Therefore, design cannot ensure the ultimate implementation of a social innovation on its own, or in other words designers cannot be "responsible in terms of the way they engage with and deliver local social, political and ethical objectives […]", but rather that designers and design can assume a 'responsive' role within the constraints of a social innovation. This is achieved by adapting and responding to the changing needs of stakeholders, as well as contextual, social and economic factors, within the limits of design as a field of inquiry and practice.

To inform the work being done within the Innovage project, we adopted a participatory 'responsive' approach involving potential stakeholders in the processes of 1) defining the problem context, 2) understanding the issues surrounding PA in older age and 3) discussing design concepts. In order to do so, we conducted a series of 6 design workshops with overweight older adults. We then developed a concept called iStep, based on knowledge gathered from the workshops, and piloted it in a local primary school.

Additionally, A systematic review of electronic health literature databases was conducted, by our project partners, to find intergenerational innovations that sought to reduce obesity. After developing a search strategy, 206 articles were found across 11 databases.

Following distillation and review, 19 were found that met the detailed criteria. The studies indicated that intergenerational interventions could be helpful in promoting healthy lifestyles in younger people, but no previous innovations had explored the potential of younger people influencing older people into adopting more physically active lifestyles (Authors, under review).

In order for behaviour change to occur, the Fogg Behavior Model (Fogg, 2009) posits that three factors need to come together, those being motivation, ability and triggers. In other words, the subject needs to be sufficiently motivated, possess the ability to carry-out the behaviour and there must be an effective trigger for the behaviour to happen. Considering this framework, iStep aims to 1) enhance motivation by promoting valuable intergenerational relationships, 2) be based on a form of PA that is within the abilities of a wide range of the population, and 3) provide triggers in the form of PA challenges that are time-constrained.

COHORT WORKSHOPS

A series of 6 co-design workshops were run between September 2013 and February 2014 following a process of understanding motivations and barriers to PA in the contexts of 1) intergenerational family relationships, 2) neighbourhoods and communities, 3) GPs (General Practitioners or family doctors). These topics were aligned with those specified by the Innovage project.

PARTICIPANTS

Participants attending the workshops were drawn from the NHS (National Health Service) South Yorkshire Cohort (SYC), a database of individuals compiled with their consent during regular GP surgery attendance. The SYC is a research project following the lives of 20,000 adults, over a decade, and providing information on changes in the health of the population in South Yorkshire. Social and demographic filters on participation were placed at recruitment into the workshop programme ensuring respondents would be 55 years old and above, resided in social demographic groups C1 to E (selected by geographic region) and had a BMI of 25.0 and above.

Each workshop comprised six to ten respondents, and two or three design practitioners (from three dimensional design and Human-Computer Interaction) working in a design research capacity. Each workshop lasted approximately 2.5 hours. A gratuity was paid to respondents at the end of each session in the form of a shopping voucher but participants were not aware of this prior to attendance.

METHOD

The workshops followed a semi-structured approach, where moderators had a general topic list to follow but were free to pursue relevant issues that might arise during discussion with participants. Workshop discussions were audio recorded and transcribed.

Preparatory work was conducted prior to workshop commencement in the form of pilot workshops, that were undertaken drawing on a convenient respondent sample, to help define and focus workshop methodology and content.

At the beginning of each session, participants were given a brief introduction to the Innovage project, as well as to the general topics that would be covered during the workshop.

The same broad range of topics was explored throughout the 6 workshops, given the fact that a different group of participants attended each one. The insight from one workshop was transferred over to the next if the research team found it was relevant to the discussion. For example, one of the first workshops revealed that dog walking was a popular activity, but that some participants said they were reluctant to adopt a dog out of fear that they wouldn't be able to take care of it as they aged. This topic was carried over into future workshop and illustrates how the content evolved from one session to another.

The first set of workshops broadly aimed to explore 1) the types of PA that participants currently engaged in, 2) their perceived barriers and motivations for PA, 3) intergenerational links and relationships, and 4) overall views on technology and Internet usage. During these workshops, participants also engaged in a sticky note activity that involved writing down 1) PA they currently engaged in, 2) activities they used to do but aren't able to anymore, 3) barriers to PA and 4) motivations to PA. The information from these notes was then used to promote further conversation.

Based on the discussions generated during the first round of workshops, the second phase expanded upon the initial topics to include a discussion around 1) communities and activities that are promoted by local councils, and 2) advice/information provided by GPs regarding PA. The workshops concluded with a brainstorming exercise on how to increase PA levels during retirement.

During the last 2 workshops, a number of early 'sacrificial' concepts were introduced that involved one or two of the key topic criteria. The concepts were sacrificial in the sense that they were not proposed as final solutions, but rather as tools to provoke further discussion. The 'sacrificial' concepts were produced purely as a tool to help ground discussions, and to ask 'if we did something like this, how would you respond?' Concepts were described to participants verbally and represented with images and slides that captured their general ethos. In particular, participants were asked to comment on what they thought would be the main barriers or motivations for taking part.

For the purposes of illustration, 3 of a number of these investigative 'sacrificial' concepts, are now briefly described. The concepts arose from discussion between the design and research team based on insight from the

first four workshops. At this stage the concepts' intervention criteria were kept deliberately 'loose' as not to prematurely bias emerging design directions and did not yet integrate all the criteria established by the Innovage project (social, intergenerational, PA).

The first concept (C1) had a focus on information awareness, how do people know what may be available in their area in terms of types of activity to engage with. It proposed involving GPs as sources of information about what sorts of PA could be achieved locally, and with knowledge that this could be tailored to patients' particular health related needs because of the GP setting and assessment. In this way it was suggested that, where some GP's may not currently be able to, they could provide a wider service beyond diagnosis and drug or therapy prescription.

A second group of concepts (C2) described a community and neighbourhood approach to becoming more active. One scenario in this group involved social interactions with a focus on the provision of information and tools for establishing (and/or re-establishing) 'community spirit'. The concept was based on the underlying idea of empowering key groups of individuals with the appropriate tools and resources for organising and promoting new, or existing, local community-driven activities. This could involve enabling people to re-establish lost public PA facilities, such as swimming pools, as well as gather and collate their experience of, say raising money to re-open a village hall, and the provision of materials and information that would enable dissemination of their experiences so that others could learn from them.

A third example illustrated the use of technologies that could connect younger and older people in new ways. A concept (C3) was described involving 'remote viewing' where children and older adults would wear lapel cameras, during sport for example, such that they could remotely experience each other's PA.

ANALYSIS AND MAIN FINDINGS
Two researchers involved in the workshops analysed the transcripts to identify recurring topics and identify relationships between the codes, using an open coding technique. Each topic was coded and matched with 1) a short description, 2) relevant quotes and 3) a list of related topics/codes, as to illustrate each topic and provide an overview of their context within the workshop discussions. After the individual analyses, the researchers went through the codes together to seek agreement. The codes were then screened for inconsistencies or repetitions in order to reduce the number of codes and avoid duplicate entries. Below we present a summary of the most relevant findings, in accordance with the Innovage criteria (social, intergenerational, PA), along with illustrative quotes.

1. Injuries and health issues are often barriers to PA, especially with increasing age. This happens in

cases where the individual and/or their partner have a health problem.

"I used to — do a Yoga and Pilates class once a week, but after the back problem I had to stop doing it because I was just — it was too painful."

"My husband's not very good. He's had heart attack and he's got osteoporosis, so his limbs, his bones — He's on sticks, you know? He's on crutches."

2. GPs suggesting walking, as opposed to other more strenuous forms of exercise, as a good way of staying active, within the limitations of injuries and health problems.

   "...with the Osteopenia they said keep walking, keep active, and do a little bit of varied work."

3. Information and support provided by GPs isn't always adequate. There was a level of discussion around the quality of information provided by GPs, where some participants had good supportive GPs and others did not.

   "GPs don't have time to pass on information like that."

   "Not easy to find out what is going on [at the GP surgery].*"*

4. Participants referred to the time spent playing with young grandchildren as a good way of getting more exercise.

   "I play football in the summer with my youngest grandson. I'm the goalkeeper."

5. However, there was some reluctance toward the idea of engaging with the younger generations outside of family ties.

   "[unclear] *not being that helpful but, to be honest, if you asked me, frankly, do I want to engage with a lot of strange young people, the frank answer is not really."*

6. Dog walking was described as an activity that 'forces' participants to do exercise on a daily basis.

   "I walk for about two hours a day, I guess. Yes. Three dogs. And it doesn't matter what the whether is like but they want to go out."

7. Councils do not always circulate information about local activities. Some participants mentioned living in an area where they received a local newspaper advertising activities and gatherings, but it became clear that not all councils provide this type of service. Furthermore, talking about their community networks:

   "There used to be more community spirit."

   "A community spirit is almost non-existent these days."

8. Opinion expressed that a lot of older people are computer literate, 'more and more', but a general disdain of Facebook and Twitter was observed. Nonetheless, favourable attitudes toward IT were expressed.

   "my little pal [referring to Kindle]*"*

   "[When participant stops working part-time] So I thought I'd go on the Internet and see if there are some women hanging about who would like to go in a women's walking club."

9. Engaging in group PA or doing something with friends.

   "I go to yoga with friends once a week."

   "Like you said bowling, crown green bowling, you know, a lot of older people engage in that [...]."

   "And then on Wednesday I was at a lady's place in Pickering doing herding."

10. Self-confidence was often linked to the willingness to engage in PA. This took different forms, either participants were feeling insecure about their ability to engage in certain types of PA due to health issues, or they felt self-conscious in taking part in certain types of activities.

    "I was the only one [older person] *there."*

    "Yes. I would like to go to Zumba but I'm a bit hopeless. By the time they've done this bit I'm not very — my coordination is not good."

    "But I think — I mean, confidence and activity are a big link, aren't they?"

11. Participants expressed the general opinion that younger generations might be less active than they were, due to changing social and cultural environments, infrastructure and modern working practices that centre themselves around desks and service delivery rather than manual labour.

    "More transport now."

    "The attitude of a lot of younger people now is that older people don't know anything because they live in a different sort of world to what the young do live in nowadays' ...and 'a lot of young people don't even bother with their own grandparents."

    "You didn't worry about your child, but you didn't in those days did you."

    "I used to walk for an hour to work from 6.30am."

    "At the very least parents should walk their children to school."

12. An overall consensus was observed around changes in lifestyle brought on by retirement.

    "First two months of retiring lost 2 stone. In work sat in front of a computer."

In summary, we found that participants were aware of the importance of maintaining active lifestyles into older age, even though issues such as health problems and injuries could presents themselves as significant barriers that participants needed to adapt to. We also found that self-confidence was often linked to the willingness to engage in PA and that social interaction, with friends or family, were often motivators to engage in PA. Furthermore, we discovered that council, community and GP support vary greatly depending on areas of residence.

It is speculated that three categories of 'situation' can be described that sit within the broader context and the eventual successful uptake of a social, intergenerational and physical activity interventions. Clearly, the first of these can be described as personal situation. This would include whether or not the older person has a younger family member, a family member locally, or indeed ones mutually willing to be in regular contact with. There are a variety of these personal situation scenarios and this is compounded by whether or not the older person is IT literate and has access to IT, as well as their current level of physical ability. A second category would be those that define how interested an individual may be in undertaking a particular PA type. The majority of older persons described walking as being of most interest, some expressing interest in social walking and others explicitly describing that walking was something that they wanted to do alone or alone with their dog. Other interests in PA were described, such as swimming or football coaching, but often that interest and motivation was highly specific in nature, and, with the exception of walking, did not transfer in a broad sense to the rest of the group. A third category may be described around the complexities of social demographic groupings.

Given the ambition in this project was to reach as many people (within the bounds of the selection criteria) as possible with a social innovation, it was considered that any narrow targeting of social demographic (say D's), physical activity type (say 'swimming') or personal situation (older persons with willing grandchildren and IT literacy) would prove to define interventions addressing a very narrow part of the population.

ISTEP CONCEPT

Reflecting on the findings from the workshops and the criteria defined by Innovage (intergenerational, social, PA), we iteratively developed the iStep concept. In iStep each participant uses a pedometer and registers on a website, where users can upload daily step counts and monitor their team's progress. Our intention with the iStep concept is that both members of an intergenerational team would motivate each other to engage in PA while working toward a common goal, therefore building upon grandparents' existing desire of staying engaged with their grandchildren and providing a channel for them to engage in collaborative PA.

Given the intergenerational aim of the iStep concept, we opted to run the first pilot in a primary school. A school was chosen as a source of groups of children who could link with older relatives. The intention was to engage the children in a classroom challenge and ask them to invite their grandparents to participate with them. In this context, we hypothesised that the child's motivation might be to help the grandparent stay healthy and active, while the grandparent would possibly be motivated by connecting with their grandchild and supporting them in a school-related assignment.

The chosen form of PA was walking, as it is more inclusive than other more intense forms of activity such as running or cycling. This was based on knowledge gathered from the workshops, where health issues were a barrier to PA, and GPs actively recommended walking as an optimal way of keeping active.

ISTEP PILOT

The iStep concept was prototyped and then piloted in a primary school setting. The following sections describe 1) participants and method, 2) equipment, as well as 3) main findings and future design improvements.

PARTICIPANTS AND METHOD

A total of 29 children, aged 7 to 8, from St Marie's Catholic Primary School, 15 parents and 1 grandparent took part in the iStep pilot challenge. At the start of the process, a presentation of the iStep concept was delivered to the classroom and the weeklong Sheffield Round Walk challenge was presented. Children were asked to invite an older family member, such as their grandparents, to take part in the pilot with them. All children took home an information pack including 1) an invitation to take part in the pilot, 2) an information pamphlet about the research and pilot, 3) two sets of instructions on how to sign-up to the online platform, one for the child and parents and another for the older family member, 4) two consent forms, 5) and two pedometers.

In order to take part in the pilot, participants were required to 1) return the consent forms and 2) register themselves on the iStep website.

Overall, the pilot implementation lasted for a total of 5 weeks. A member of the research team went into the classroom at least once a week to talk to the children and teaching staff. Researcher notes and observations were recorded for each of these sessions. In addition, two paper-based questionnaires were filled in by the children regarding questions about enjoyability and effectiveness of the iStep concept, as well as perceived barriers to usage.

The PA challenge itself lasted for 1 week and required each pair to collaboratively achieve 70 000 steps. Participants were required to enter their daily amount of steps on the iStep website during this week.

5

A raffle prize was awarded at the end of the challenge, in order to reward participants for their willingness to engage. The following section presents our main observations from conducting the pilot at the school.

EQUIPMENT

Participants were given a low-cost clamshell pedometer. The pedometers were of the mechanical (pendulum) type and are not as accurate as more expensive accelerometer-based devices. However, given that the minimum number of pedometers needed would be 33 children + 33 family members = 66 pedometers, and the fact that the pilot being reported here is the first in a series of pilots, the team felt that the low-cost devices would be the most appropriate.

MAIN FINDINGS AND DESIGN IMPROVEMENTS

Even though the observations and findings, reported in this section, are specific to the context of St Marie's, we feel they could be applicable to other contexts with similar aged children in primary school settings. A lot of these considerations would seem to be useful to researchers conducting similar pilots, by providing insight into planning and execution, as well as pointing out potential pitfalls that might be more easily avoided in the future. We present our observations according to the main topic areas that were identified during the process of running the pilot, these are 1) availability of older family members to participate, 2) registration on the website and access to networked devices, 3) commitment to the challenge, and 4) pedometers.

AVAILABILITY OF OLDER FAMILY MEMBERS

Several issues arose around partnering-up with a grandparent or older family member. Not all children had grandparents, a lot of them lived far away, and some of them had grandparents who were too ill to take part. In total, 5 older family members returned a consent form, which left most children without a teammate. At this point, we spoke with the children and agreed that they should be able to participate with one of their parents instead of a grandparent. Partnering with a parent also revealed a set of issues surrounding family dynamics and divorce or separation. In the end, 10 of the 15 parents that signed-up actively participated in the challenge. This demonstrates that family dynamics are widely variable and are an important issue that should be fully considered in the design of intergenerational programs. It became clear that concepts of this kind should allow wide room for diverse family compositions, as well as avoid excluding participants based on such dynamics. They should provide space for intergenerational family participation but also consider solutions that cater to individuals who do not have access to these family relationships.

Furthermore, communication with family members posed a significant barrier to the running of the pilot. Given the fact that we piloted iStep in a school, all communication with parents and older family members was conducted through the children. We would verbally communicate the project and the processes involved in taking part with the students in class and then send written information home to the parents. However, there was no reliable channel for receiving communication back from family members. During the pilot, we approached the school about engaging with parents directly through a meeting, or other organised school event. However, this was not possible and sheds some light on the fact that designers and researchers need to adapt and work within the constraints of how each school operates.

Based on these findings, it was decided that the platform design should be flexible enough to allow users to choose teammates according to individual preferences and circumstances. This will allow room for intergenerational partnerships, which will be actively promoted on the website, but also for other team compositions.

ACCESS TO NETWORKED DEVICES

Overall, children's lack of access to the Internet and a computer was a major issue throughout the pilot.

Most children reported having trouble in accessing a computer to enter their daily amount of steps. It was observed that the children were too young to have their own devices. They did not have personal computers and mentioned having to ask their mom or dad to use one of their laptops, which they weren't always allowed to do. We also found that overall the children were too young to be permitted to use the Internet unsupervised.

In addition, the children did not have their own email accounts or the correct mental model of what email is. During the sign-up process, participants were required to click on a verification link that was sent to their email addresses. Even though the school did create email accounts for each student, the children 1) did not understand this part of the process, and 2) did not know how to access their own school email accounts. In order to get around this barrier, the children's accounts had to be manually activated by one of the researchers.

Even though by week 3 we had 29 out of 33 consent forms returned, very few students and family members had signed-up to iStep. This lead us to conduct a collective sign-up session at the school with all the children involved, where one of the researchers performed a live step-by-step tutorial showing students how to register.

Finally, the teaching assistant informed us that the children were too young to be expected to remember usernames and passwords. To resolve this issue, we printed each student's login details on a small card that we then handed-out to them. The login card idea follows the same method currently used by the school, where each student carries their login details in their pocket for the computers used in IT classes.

To address these issues it was decided that in future 1) email verification will be removed altogether and 2) we

will trial the concept with slightly older children who are at an age where they have easier access to IT.

COMMITMENT TO THE CHALLENGE AND PHYSICAL ACTIVITY LEVELS

On average, it took about 3 weeks to get the signed consent forms back from the students. During this period, the school sent out 2 official reminders to parents. During one of the sessions, the researcher became aware that some of the children had lost the consent forms but were reluctant to let us know. It was important, at this point, to make the children feel they're in a safe environment and that they wouldn't be judged or reprimanded for loosing the form. After this was made clear, a few students admitted to needing a new consent form.

The weeklong Sheffield Round Walk challenge started the Monday after all the students had been collectively signed-up.

Overall, during the week of the challenge 17 students, 1 grandparent and 8 parents entered steps onto the website at least once. Of those participants, 1 grandparent, 7 parents and 13 children entered steps for at least 5 days.

Using a paper-based questionnaire, we asked the children why they weren't regularly entering steps onto the platform. The majority of responses were either related to 1) forgetting to input steps, 2) not having access to a computer at home, or 3) lost and broken pedometers. The quotes below illustrate some of these issues and have been transcribed according to their original form, including spelling mistakes.

P02: "Our computer is really slow."

P03: "It's [pedometer] broken"

P04: "I have lost my pedometer"

P05: "I have fgoten to put my pdometer on evry day. So I have not don it."

P07: "Our laptops stolen and the computors really really slow."

P14: "I am not allowed to use my mums laptop and my other computer doesn't work."

P15: "i don't have a computer and I didn't go in the ice seety [ICT] sweet [suite]."

P25: "I can't go on because I don't have an computer and I don't get to school eirly to do it."

Nonetheless, children's comments regarding the experience of taking part in the pilot demonstrated a positive influence on their behaviour and a desire to be more active, as shown by participants' responses to the question "Has this project changed your day-to-day in any way?"

P02: "Yes because it has made me go on bigger walks to get more steps. I have normally done more steps each day on the graph on the website."

7

P04: "this project has changed my days because I do more running."

P05: "The project has changed my day because I have got loads moar actv by runing and walking evrwer."

P06: "Yes because you realy want to get more steps then [sic] the last. Another way was it made me want to be more active and do more sports."

P07: "I think it's made me more active."

P09: "I walk to school now I yoost to driv alot I sicel, scooter and I walk."

P11: "It has made all of my family more fit. It has made my dad run about 3 more miles in his events. It has made me do more exisise at a lot off things. It was very fun because I enjoyed putting my steps in every day. I hope it works out for other children."

P13: "Yes it changed my day by making me get off of the couch and see all of Sheffield."

P21: "Yes because ime out on the park alot more."

P22: "This project has changed how many steps I have done because each day I want to improve my steps."

P25: "It did chang my day because I did more exasize and walked more and did more [illegible]. Thank you!!!"

P28: "Yes. It has changed it by: One day making me walk to school I've never done it before. It got me more active than before"

P32: "It has changed my days because I was more active and I did lodes of walking, running Jogging and Jumping."

PEDOMETERS

One of the major issues with the pilot was the high loss of pedometers. Initially, we distributed a total of 66 devices along with the participant information packages. We found that the parents who chose to not take part in the study did not return the unused devices. During the course of the pilot we replaced a further 42 pedometers that had been either lost or broken. A few of the children had lost more than one pedometer by the end of the pilot. The teacher and teaching assistant commented that the level of lost devices would vary considerably depending on the group of children taking part in the study, with this one being particularly prone to losing things such as letters from school. Nonetheless, given that the children taking part were quite young, it was expected that a large number of devices would be misplaced.

For the St Marie's pilot we thought that the pedometers might have functioned as an incentive for participants to complete the necessary paperwork and register online, however this is not what was observed in practice.

The fact that the pedometers were not accurate did not seem to affect children's motivation during the pilot. However, the children did notice the inaccuracy and

mentioned that their pedometers weren't counting the right amount of steps. Although motivation levels were high during the course of this pilot, the accuracy of the pedometers could affect motivation in the long-term, as participants may feel that their effort is not being adequately counted or rewarded.

The technology-related findings from the workshops, with older adults, led us to choose pedometers without Bluetooth technology and with a simple display where participants could easily view their steps and manually enter them online. However, in the effort of making iStep more inclusive, we might be limiting it for younger generations who are familiar with Bluetooth and would probably appreciate its capability for automatically uploading data to the website. A future iteration of iStep might need to accommodate functionality for a more diverse range of pedometers and allow participants to choose their own preferred device.

For future pilot implementations, the research and design teams have decided that more accurate accelerometer-based devices are required to reduce the possible effect of step count inaccuracies on participant motivation. Additionally, pedometers will only be distributed after participants have signed consent and registered on the platform, as to avoid such high levels of device loss and reduce the costs of implementing the pilots.

DISCUSSION

In a sense the six workshops, being very broad in the nature of subject enquiry, told the designers what to avoid integrating within any concepts for progression rather than specifically identifying a product idea. It became clear that strenuous or less conventional (e.g., Zumba) forms of exercise would pose barriers related to physical ability and self-confidence. Additionally, even though, in general, participants were not opposed to IT and the Internet, it did become clear that their experience of these mediums was limited and the final concept could not heavily rely on emerging technologies. We have tried to be as inclusive as possible, requiring a standard computer with Internet access and providing low-tech pedometers. This however has uncovered issues related to 1) step count accuracy and 2) participants' failure to manually enter data onto the website.

Regarding the younger generation, access to IT was also a major barrier to the implementation of iStep, with children not having access to their own devices and not being able to browse the Internet unsupervised. The next pilot will be conducted with slightly older children (aged 12 to 13) with the aim of observing if the impact of issues such as access to IT, forgetting to enter steps and losing pedometers will be reduced. It is generally accepted that children are given a mobile phone, which in now likely to be a smartphone, when they leave primary school and that computers are more widely

available in secondary schools. These factors will hopefully mitigate the IT-related issues observed in the pilot being reported here. Similarly, we feel that the fact that children frequently forgot to enter steps onto the website might have been largely influenced by not having an immediate way of doing so, where again wider access to IT might alleviate this problem.

The workshops also highlighted older participants' mixed opinions regarding socialising with people of different generations. This was bi-directional, with some older people saying they had no interest in socialising with the younger, and others saying they believed younger people had no interest in socialising with them. However, there were examples that clearly illustrated willingness, and a motivation to connect with grandchildren, where, for example, one participant said 'If they were grandkids, yes definitely'.

Older family members' participation in the pilot was limited. As previously discussed, this could be a reflection of intricate family dynamics, where grandparents aren't always able to participate closely in their grandchildren's lives. However, given that we couldn't communicate directly with parents and/or grandparents we can only speculate as to the possible reasons for low uptake. This could indeed have been a reflection of older family members' unwillingness or disinterest in taking part in intergenerational PA.

Finally, even though older participant uptake was limited during the pilot, a number of parents took part with their children. This doesn't immediately address today's older adults but it does promote a more active lifestyle amongst current adults and children who will hopefully be motivated to lead a more active lifestyle into older age, which is interesting given the fact that these demographics are not currently meeting minimum PA requirements.

Future iStep pilots will aim to 1) explore and discuss the reasons for low uptake directly with older family members and 2) assess whether low uptake was specific to the age of the children and context of that particular class at St Marie's or if it reflects a broader phenomenon. This will provide us with more insight regarding the potential advantages and disadvantages of an intergenerational intervention.

ACKNOWLEDGEMENTS

REFERENCES

Badke-Schaub, P., Billing, J., Binder, T., Borgford-Parnell, J., Brandt, E., Brereton, M., . . . Cooper, T. (2011). CoDesign: International Journal of CoCreation in Design and the Arts. *Small, 7*(3-4).

Basterfield, L., Adamson, A. J., Frary, J. K., Parkinson,

K. N., Pearce, M. S., & Reilly, J. J. (2011). Longitudinal study of physical activity and sedentary behavior in children. *Pediatrics, 127*(1), e24-e30.

Cottam, H., & Leadbeater, C. (2004). RED paper 01: Health: Co-creating services. *London: Design Council*.

Design Council. Active by Design: Designing places for healthy lives.   Retrieved 23 January 2015, 2015, from http://www.designcouncil.org.uk/projects/active-design

European Commission. Definition of Social Innovation. Retrieved 23 January 2015, 2015, from http://ec.europa.eu/enterprise/policies/innovation/policy/social-innovation/past-editions/definition_en.htm

Fogg, B. J. (2009). *A behavior model for persuasive design.* Paper presented at the Proceedings of the 4th international Conference on Persuasive Technology.

Fox, K. R., Hillsdon, M., Sharp, D., Cooper, A. R., Coulson, J. C., Davis, M., . . . Stathi, A. (2011). Neighbourhood deprivation and physical activity in UK older adults. *Health & place, 17*(2), 633-640.

Hallal, P. C., Andersen, L. B., Bull, F. C., Guthold, R., Haskell, W., Ekelund, U., & Lancet Physical Activity Series Working, G. (2012). Global physical activity levels: surveillance progress, pitfalls, and prospects. *The lancet, 380*(9838), 247-257.

Hamer, M., & Chida, Y. (2009). Physical activity and risk of neurodegenerative disease: a systematic review of prospective evidence. *Psychological medicine, 39*(01), 3-11.

Jarrett, D. (2010, 02 February 2015). Aconchego Program.   Retrieved 02 February 2015, from http://www.socialinnovationexchange.org/ideas-and-inspiration/health-and-wellbeing/case-study/aconchego-program

Nied, R. J., & Franklin, B. (2002). Promoting and prescribing exercise for the elderly. *American Family Physician, 65*(3), 419-426.

Sanders, E. B. N., & Stappers, P. J. (2008). Co-creation and the new landscapes of design. *Co-design, 4*(1), 5-18.

Scholes, S., & Mindell, J. (2013a). *Health Survey for England 2012: Physical activity in adults*. Health & Social Care Information Centre Retrieved from http://www.hscic.gov.uk/catalogue/PUB13218/HSE2012-Ch2-Phys-act-adults.pdf.

Scholes, S., & Mindell, J. (2013b). *Health Survey for England 2012: Physical activity in children*. Health & Social Care Information Centre Retrieved from http://www.hscic.gov.uk/catalogue/PUB13218/HSE2012-Ch3-Phys-act-child.pdf.

Thorpe, A., & Gamman, L. (2011). Design with society: why socially responsive design is good enough. *CoDesign, 7*(3-4), 217-230.

9