

INVOLVING END-USERS IN THE DEVELOPMENT AND IMPLEMENTATION OF A WEB-BASED, PHYSICAL ACTIVITY PLATFORM FOR ELDERLY

Inge van Bruinessen¹, Jan-Willem van 't Klooster², April Boessen³, Loek van der Heide³,
Miriam Vollenbroek-Hutten⁴ and Sandra van Dulmen⁵

¹*Netherlands Institute for Health Services Research, Utrecht, The Netherlands*

²*Roessingh Research & Development, Enschede, The Netherlands*

³*Zuyd University of Applied Sciences; Maastricht University, Maastricht, The Netherlands*

⁴*Ziekenhuisgroep Twente, Enschede, The Netherlands*

⁵*Netherlands Institute for Health Services Research; Radboudumc; University College of Southeast Norway
Utrecht, The Netherlands; Nijmegen, The Netherlands; Drammen, Norway*

ABSTRACT

Physical activity is an important health behavior when it comes to preventing or slowing down disablement caused by ageing and chronic diseases. With the LIFE project we aspired to support pre-frail older adults to deploy and maintain a physical active lifestyle by integrating existing on- and offline services via a web-based self-management platform. Contrary to the often applied top-down 'waterfall' methods used to develop such web-based interventions, we applied a bottom up inspired procedure. Targeted end users (elderly and (health) professionals) were involved from the early beginnings. In this way their knowledge, preferences and needs could influence the design, functionality and implementation of the platform. The applied process, inspired on Design Thinking, comprised seven rounds. These rounds were not all planned in detail at the start of the project; outcomes of the first sessions guided the goals and structure of the successive steps. We experienced that it was relatively easy to get elderly and professionals involved and to let them influence the development of the platform. However, the participants had a specific interest in maintaining their active lifestyle and many of them had already implemented physical exercises as part of their daily routine. They were enthusiastic about the offline modules offered by the platform, but did not use the online modules at home because of usability issues, the lack of discipline, the feeling of insecurity and the lack of a social component.

KEYWORDS

eHealth; Co-Design; Physical Activity; Healthy Aging; Elderly

1. INTRODUCTION

Physical activity is an important health behavior when it comes to preventing or slowing down disablement caused by ageing and chronic diseases (Tak et al., 2013). Physical, psychological and social changes can challenge elderly to have a physical active lifestyle. To promote healthy behavior and support elderly with staying active, many interventions have been developed. The last decennia a considerable amount of interventions is being delivered via the Internet.

Traditionally, the sequential 'waterfall' method is used to develop these web-based interventions. With this method, the planning, process and costs are strictly controlled and from the beginning there is a clear idea about what the end-product will do. However, the lack of user-involvement in this top-down, expert-driven method is often indicated as a cause for the frequently reported problems with use, adoption and attrition (Eysenbach, 2005). Today, methods are advocated and applied that include end-users from the early beginnings of the development phase (i.e. user-centered design) (Mummah et al., 2012; Bartholomew et al., 2011). The potential benefits of involving end-users from the start of a project are widely accepted and it claims to facilitate more effective interventions (Mummah et al., 2012). Yet, little is described about the operationalization of co-creating web-based products with elderly.

The LIFE project aspires to support pre-frail older adults to deploy and maintain a physical active lifestyle by providing physical activity services via a web-based platform (Van 't Klooster et al., 2017). This platform was co-created with and for the targeted population.

The goal of this descriptive paper is to i) outline how elderly and their health professionals were involved in the development and implementation of the platform, ii) how their input influenced the design, functionality and implementation of the platform. To conclude we share our lessons learned regarding the participatory process that may inspire researchers and designers who are working with web-based (activity) products and services for elderly.

2. METHOD

The LIFE project started with the idea to support the rapidly ageing population with deploying and maintaining a physical active lifestyle by means of promoting self-management. Based on the Self Determination Theory (SDT), we envisioned a web-based platform that offered a selection of activities tailored to the user's preferences and needs. According to the SDT, autonomy is an important factor to achieve goals; like the goal to keep up a physical active lifestyle (Ryan and Deci, 2000). The concept of autonomy in the platform could be operationalized by providing support without interference of professionals and giving users the opportunity to compose their own activity program out of a range of activities. These activities could include on- and offline modules. The online modules were available video clips of exercises for strength, endurance and mobility training, that were validated in previous projects (Campbell, 2005). Our idea was that users could follow these modules in their daily environment, as often and as intensive as they wish. The offline modules could contain regularly or incidental activities organized locally. At the start of the project, only the online modules (the video clips) were available. The other 'building blocks' of the platform (e.g. structure and design of the website, implementation plan) were still rough ideas.

2.1 Participants and Setting

The target group consisted of pre-frail elderly who were able to use a web-based program independently or with minimal support by a professional. Care professionals, who may play a role in the implementation and uptake of the platform (e.g. by managing the local activity modules or providing support to the elderly), were also considered potential end-users. The LIFE project was introduced in a residential home for elderly with in-house (health care) services available. A group of 16 elderly (aged 74-91 years old, average 83) and professionals (physiotherapist, nurse, occupational therapist) from this home volunteered to the co-creation steps. The group composition varied per step. The project was executed in 2016 – 2017.

2.2 Development Approach

We applied a step-by-step approach (figure 1) for the development of the platform and its' implementation plan. This approach was inspired on Design Thinking, which views knowledge about users and their involvement in the design process as a central concern (Kelly and Kelly, 2013). The seven steps of the approach were not all planned in detail at the start of the project; outcomes of the first sessions, guided the goals and structure of the successive steps. Descriptive data was gathered along the iterative co-creation cycles and documented in a logbook. In this logbook the researchers documented activities, outcomes, and changes made to the intervention and implementation plan.

| | Rounds | Participants | Goals |
|---|----------------------|------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | (group) interviews | 22 care professionals, 38 residents | Specify preferences and needs of target group (what (de)motivates to be active? What do they have already? What do they miss?) |
| 2 | (group) interviews | 6 care professionals, 24 residents | Prioritizing product requirements. Gathering ideas about how the platform could be integrated in the environment of the end-users |
| 3 | Heuristic evaluation | 7 eHealth professionals | Improving the usability and credibility of the LIFE demo and find bugs. |
| 4 | Focus group | Care professionals and managers working at the residence | Further develop the implementation strategy |
| 5 | Focus group | 8 residents, 2 care professionals, 1 client board representative | Improving the design and functionality of the platform |
| 6 | Kick-off & Pilot | 15 pilot testers, 1 client board representative, 3 professionals | Promote active lifestyle, demonstrate the possibilities of the platform, recruit pilot testers. Evaluate the use with residents and professionals. Use the experiences of the pilot testers to develop the next version of the platform |

Figure 1. The Applied Step-By-Step Co-Creation Approach

The first step resulted in a list of user preferences and product requirements (Boessen, 2016). Based on these results we developed paper mockups of the platform and four user scenarios (describing the context, story and goals of an end-user representing the target group). These documents gave insight in characteristics and goals of the target group and it helped to define product requirements and the implementation plan.

In the second step, participants could reflect on the mockups and prioritize the list of product requirements and user preferences. Also, ideas were inquired about how the platform could be integrated in the daily lives of the end-users. This information was translated to care pathways (Van 't Klooster et al., 2017; Boessen et al., 2016). A care pathway can support the implementation of the platform by for example identifying relevant stakeholders, charting possible sequential activities, clarifying goals and defining the target group characteristics (Schrijvers et. Al., 2013). The requirement lists and user scenarios were further defined. With these outcomes a first web-based prototype was designed.

In the third round, eHealth experts were asked to evaluate the usability and credibility of the first web-based prototype. The evaluation was guided by a list of heuristics (i.e. recognized usability and credibility principles) (Chisnell and Lee, 2006; Fog, 2014), composed to objectively evaluate web-based interventions for elderly. The heuristics concerned consistency, user control and efficiency. With the findings of this evaluation we could solve the first bugs and adapt issues influencing the usability and credibility in a next web-based version of the platform.

The fourth round was focused on the implementation of the platform. With (health) professionals and representatives of the management team, we discussed how the platform could be integrated and used as part of their organization.

In the fifth round, the next version of the platform was presented to 11 potential end-users (elderly and professionals) aiming to evaluate the design and functionality. On a large screen, we showed the platform and demonstrated its functionalities. Attendees shared their first impressions and ideas, reflected on the visual

design and functionalities. In addition also implementation issues were discussed. The platform was adapted according to the attendees' feedback and a kick-off meeting for all residents was planned.

The sixth round concerned a seven week during pilot that started with a kick-off meeting. During the kick-off, an introduction was given about active living and the platform was demonstrated. The attendees who were interested, could volunteer to pilot test the platform. Researchers supported them with registering and starting up an account on their personal computer, tablet or smartphone. Of the 26 attendees, 15 subscribed. During the pilot weeks, use of the platform elements was monitored with log files. The researchers kept in close contact with the involved professionals and pilot testers, provided support and adapted the platform based on their feedback when necessary.

3 RESULTS

3.1 The Influence on the Development of the Platform

A range of issues that were suggested by participants, guided and inspired the development of the initial product idea;

The social component; an important, recurring theme was the fact that being physically active was not a goal in itself for the elderly. Social contacts and staying independently as long as possible motivated them to be physically active. This influenced for example the way we communicated about the platform, (e.g. as part of general information about the importance of an active lifestyle and the social component of the offline modules was emphasized. Also, a functionality was developed to give users the opportunity to upload local (offline) activities such as their weekly swimming group and walking group.

Personalized advice; participants emphasized the importance of personalized advice, e.g. based on the varying activity preferences and physical limitations of users (e.g. wheelchair activities). We operationalized this by providing the users of the platform with a personal account in which activities were prioritized based on a recommender system. Yet the participants were not very enthusiastic about making a password protected personal account. At least, they wanted to learn more about the platform before they made the decision to register. For that, the homepage was adapted with more information, example modules and a short video clip introducing the platform.

Design and Structure; regarding the design of the platform, a range of usability, credibility and readability issues were developed or adjusted. For example, it was considered important to show the option to enlarge the screen clearly in the home page and the terminology that was considered too technical was adjusted. Regarding the structure of the platform, the way on- and offline modules were searched and clustered was not clear in the first version and more information was preferred about the offline activities (like available guidance, difficulty, costs). We added this information via a standardized form that needed to be completed for each activity.

Recognizability and integration; involved professionals pointed out the opportunity to use platform as an extended digital version of their activity program distributed in their monthly paper based journal and that the platform should look familiar to its' users. Therefore we customized the visual design of the platform to the corporate identity of the residential home, so users would recognize it as an in-home service.

3.2 Preliminary Findings of the Pilot

Participants were enthusiastic about the offline modules, but a range of problems arose when using the online modules. Different problems with this part of the platform were mentioned; 1) safety and insecurity issues (e.g. fear of getting injured, exercising in the wrong way), 2) usability issues (e.g. exercising while watching and operating the laptop, old software that could not run the videos) and 3) the lack of discipline to exercise alone at home.

An interesting movement was that a group of participants formed a 'LIFE exercise group'. Each Wednesday they gathered and followed together a part of the online modules that were projected on a large screen. These sessions were guided by the physical therapist. In this way, the safety and insecurity issues were solved and the social component was incorporated.

With the results of the pilot, the platform was adjusted and a second information ‘kick-off’ for the residents was planned.

4. LESSONS LEARNED

In this paper, we described the participatory approach applied to involve end-users in the first phases of developing a web-based activity platform. Although it was a time consuming process, we experienced that it was relatively easy to get end-users involved and to let them influence the design and functionality of the platform. However, the participating elderly all had a specific interest in maintaining their active lifestyle and many of them had already implemented physical exercises as part of their daily routine. We failed to include elderly who were more in need for support with deploying a physical active lifestyle. For the further development of the platform, we should focus specifically on reaching this group.

After the pilot, participants were enthusiastic about the offline modules, but did not use the online modules as intended. Although they had come up with a solution (the LIFE exercise group), our initial idea to promote self-management in this way, did not work out well. This result emphasizes the importance of testing (parts of) the platform in a very early stage. For example, we could have tested the online modules as separate feature, before starting with the pilot. To conclude, the influence of the end-users was valuable, but we have not reached our goals with the platform yet and further (participatory) research and development steps are needed.

REFERENCES

- Bartholomew LK, et al. 2011. *Planning Health Promotion Programs: An Intervention Mapping Approach*. San Francisco, CA: Jossey-Bass.
- Boessen ABCG, et al. *Co-creation of a technology supported self-management program to promote physical activity in older adults: defining user needs and requirements*. The European Journal of Public Health 26(suppl_1)
- Campbell AJ, et al. 2005. *Randomised controlled trial of prevention of falls in people aged ≥ 75 with severe visual impairment: the VIP trial*. BMJ, 331(7520), 817
- Chisnell JR, Lee A, 2006. *New heuristics for understanding older adults as web users*. Technical Communication;53: 39-59
- Eysenbach G, 2005. *The law of attrition*. JMIR, 7(1):e11.
- Fogg BJ, accessed 2014. *A Research Summary from the Stanford Persuasive Technology Lab*. Stanford Guidelines for Web Credibility. URL: <https://credibility.stanford.edu/guidelines/>
- Kelley T, Kelley D, 2013. *Creative Confidence: Unleashing the Creative Potential Within All of Us*. New York: Crown Business.
- Mummah SA, et al. 2012. *IDEAS (Integrate, Design, Assess, and Share): A Framework and Toolkit of Strategies for the Development of More Effective Digital Interventions to Change Health Behavior*. JMIR Vol 18, No 12.
- Ryan RM, Deci EL, 2000. *Self-Determination Theory and the facilitation of intrinsic motivation, social development and well being*. American Psychologist, 55(1), 68–78
- Schrijvers G, van Hoorn A, Huiskes N. *The care pathway: concepts and theories: an introduction*. Int J Integr Care. 2012 Jan-Dec; 12(Special Edition Integrated Care Pathways): e192.
- Tak E, et al. 2013. *Prevention of onset and progression of basic ADL disability by physical activity in community dwelling older adults: A meta-analysis*. Ageing Research Reviews Volume 12, Issue 1, Pages 329–338. Van 't Klooster JW, et al. *Introducing Personalised Self-Management to Support Physical Activity in Elderly: a Case Study*. Under review