

I Don't like Gaming, It Leads to a Pressure to Perform: Older Adults Refused Gaming Elements in a Digital Home-based Physical Training Programme in Two Qualitative Studies

Claudia Oppenauer-Meerskraut¹, Johannes Kropf², Anna Bösendorfer³, Matthias Gira²,
Mario Heller⁴, Kerstin Lampel⁴, Andreas Kumpf⁵ and Tanja Stamm^{1,*}

¹*Institute for Outcomes Research, Center for Medical Statistics, Informatics, and Intelligent Systems,
Medical University Vienna, Spitalgasse 23, Vienna, Austria*

²*Center for Health and Bioresources, AIT Austrian Institute of Technology, Donau-City-Straße 1, Vienna, Austria*

³*University of Applied Sciences FH Campus Vienna, Favoritenstraße 226, Vienna, Austria*

⁴*St. Pölten University of Applied Sciences, Matthias Corvinus-Straße 15, St. Pölten, Austria*

⁵*WPU GmbH, Föhrenweg 14, Baden, Austria*

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Abstract: **Background:** Physical activity in older adults is an important protective factor for preventing morbidity and mortality and increases well-being and independent living. Within the so-called “Train and Win” project, a physical home training program with gamification elements based on the Microsoft Kinect sensor and an avatar will be developed. **Method:** Two user studies using a qualitative approach were conducted in order to guarantee a user-centered design: a focus group with 14 participants and a mock-up study with seven participants. **Results:** Contrary to published literature and our expectations, a majority of participants (8/14; 57%) explicitly refused gamification elements, such as competitions between the participants or motivational design inputs for process feedback. Thus, the training program should be related to the physical training experiences of the participants which were mainly sports and be “realistic” in terms of the presentation and interaction with the avatar. Both studies showed the necessity for an individually designed training, including typical non-technology aspects of a physical training. **Conclusion:** The results stress the importance of considering diverse attitudes, technology experiences and needs of older adults. For a high user acceptance, the training has to be individually adapted and consider more traditional non-technology training elements than gamification issues.

1 INTRODUCTION

Physical activity is a major factor for enhancing older adults' health, functioning in daily life, independence and cognition. (WHO, 2011). Older adults who are regularly physically active have a reduced risk of falling and live longer independently at home (Bherer et al., 2013). Nevertheless, aging related declines of physical health, cognitive functionality and social engagement can reduce the engagement in physical and daily activities (Reuter, 2012).

Numerous programs to facilitate physical activity in older age exist. However, they need to be

personalized and well-fitted to the needs of individuals who use these programs. Digital technologies offer innovative possibilities to deliver well-fitted exercises at home, to ensure regular training through motivation and to give feedback tailored to the individual needs (van Diest et al., 2013). A user-centered design approach ensures that the expectations and needs of future users are met already during the development of a new technological product to ensure optimal acceptance and applicability.

In this work, the user-centered design approach for the creation of a virtual training system using gamification elements is presented. Sardi et al., (2017) discuss the relevance of gamification in e-

health and summarize the most significant gamification elements which are a mix of game mechanisms (e.g. points, badges, leader boards, rewards) and game experience design elements (e.g. countdown, storyline, discovery, quests and challenges, levels) in non-game contexts (McKeown, 2015). A mean of promoting competitions is making tasks and outcomes visible to other users (Park and Bae, 2014). All these gamification strategies aim to increase long-term engagement/motivation and make (physical) activities more pleasant for the users.

In the present project, an occupational and physical therapy-based training module for prevention and facilitation of mobility and flexibility for people at the age of 65 and older is developed based on two qualitative user studies. An Information-Communication-Technology (ICT) based system with a Microsoft Kinect sensor is installed at the user's home using their own TV set, showing a motivating avatar who gives feedback and tips on general health awareness and health literacy. In order to explore user requirements and needs for the training program, two user studies were conducted using a qualitative approach prior to the development of the system.

Various studies have shown a correlation between beginning age related limitations of physical activity and mobility with multimorbidity. An akinetic lifestyle has a negative impact on the cardiovascular system (Wei, 1992), the musculoskeletal system (Plaumann and Walter, 2008) and the respiration system (Heinhold and Plesch, 2004). Tschannen and Gertsch (2007) investigated the positive influence of active mobility of older adults on self-esteem, identity and independence, and further implications for social inclusion and integration. Additionally, activity reduces the risk for age related depression (Gallaway et al., 2017).

A positive effect of exergames could be shown in the past by van Diest et al., (2013). Larsen et al. (2013) have performed a meta-study and could derive a positive effect on balance, agility and motivation by increased mobility in old age from 7 out of 8 considered studies. Nevertheless these studies have also shown that systems currently available on the market are not sufficient to ensure large and sustainable effects on health.

2 USER CENTRED DESIGN APPROACH

To determine user requirements regarding the physical training program, a qualitative approach was used: (i) a focus group with 14 participants discussing major needs and requirements for the training and (ii) a mock-up study with seven participants investigating design and understanding of interface design ideas.

Participants of both studies were healthy older adults from the age of 60 living independently at home and interested in the participation of the physical training program. Thus, results of our studies presented here can only be interpreted with regard to a motivated group of people willing to increase physical activity levels. For an adequate training participation, "healthy" was defined by the following exclusion criteria: (i) Participants should not take regularly medication which influences balance or coordination in a way that it prevents them from participating in the present study; (ii) participants should have no other un-treated psycho-neuro-motoric diseases; (iii) participants should not have visual or hearing impairments which could interfere with performing the training program; (iv) participants should not have any chronic diseases which are incompatible with performing the training program and (v) participants should not have any self-reported problems with balance.

All participants were from the same rural region in Austria and recruiting was supported by the regional project partner "Mühlviertler Alm".

3 FOCUS GROUP STUDY

The focus group study was the first qualitative sub-study in the project investigating major user needs and requirements for the physical training program. A semi-structured interview guide dealing with the topics leisure activities, sports, use of technologies, use of technologies in the area of leisure and mobility, expectations and needs for the training program, expected benefit and reasons participation in the project was used. An example question was: "Please describe your experiences with home training videos or home exercises."

All participants were informed in detail about the procedures of the study. They were asked to sign an informed consent before the start of the group discussion. The study was submitted to the

Ethical committee in Upper Austria.

3.1 Methodology Focus Group

In a first step, audio material from the focus group was transcribed and amended with the notes of the focus group moderator (CO) who was an expert for user centred studies. Secondly, the transcribed material was analysed with the comparative content analysis method (Coenen et al., 2012). In this method, data is organised in categories respecting also frequency aspects of the qualitative data. Categories were further splitted in main issues and meaning units. A disadvantage of the focus group methodology is that not all participants equally responded to the same questions. Thus, results were not representative for the whole discussion group (Goodwin and Happell, 2009).

3.2 Focus Group Results

Overall, 14 (4 female, 10 male) older adults participated. All but one participant were already retired and mean age was 67.2 years ($SD = +/-3.9$).

3.2.1 Leisure Activities/Sports

In general, the focus group participants were active in terms of leisure and sports activities. More than half of the participants go cycling (8; 57%) and hiking (7; 50%). Five participants (36%) go routinely for a walk and four participants (29%) conduct regular physical trainings with specific YouTube videos at home. Further activities (each activity was named by one person; 7%) were swimming, dancing, skiing, tennis, cross trainer and martial arts.

3.2.2 Motivation for Physical Activity

The participants' reasons for physical activity were quite broad and go beyond the straight definition of physical activity. One male person said *"You feel better afterwards. Everything is much easier."* Motivational reasons for being physically active were self-perceived/self-reported increased well-being (3; 21%), physical fitness (2; 14%), improvement of sleep quality (1; 7%), maintenance of body weight (1; 7%), need for movement (1; 7%), psycho-hygiene (1; 7%), knowledge about positive effects of physical activity (1; 7%), corporate feeling (1; 7%).

3.2.3 Technology Experiences

Some participants used technology for supporting their physical activities. Only two persons (14%) used a smartphone application with reminders and monitoring of running/walking, one person (7%) uses a step counter app and another person uses a step counting wristband. Two persons use YouTube videos for physical training at home, one person has once used a game console together with grandchildren for a physical activity game.

3.2.4 Expectations Training

Eight participants (57%) explicitly refused gamification elements: five persons (36%) wish to see their personal training score/training development only. Three persons (21%) explicitly emphasize that they do not want comparisons in or between the training group and all other participants of the focus group agreed. One male participant said:

"I don't like such networking processes within the group because then a pressure to perform arises."

One person stated that it would be ok if this comparison would be anonymized. Further, a need for assessment of pain during the training was pointed out (2; 14%).

Regarding the expected benefit of the training program, five older adults (36%) reported a holistic health awareness meaning the program should recommend health related issues for a healthy life style as well. One female person said:

"For me, it (the program) raises awareness that physical activity is something important for us and that we all can do something on our own to remain our personal health and stabilize a given condition."

Respectively once other statements were: fall prevention, increase of mobility, increase of balance, increase of coordination and physical resilience, corporate team feeling and motivation to move.

For the training program two persons wish for an individually adaptable training. Other requirements for the training vary from person to person: various exercises, feedback for improvement, exercises should be chosen by experts for physical training/physiotherapists, exercises with bottom-up difficulty levels, recommendations for exercises without program.

Concerning the interface design the requirements differ between the participants. Ideas

for the appearance of the avatar or the design of the main menu vary significantly between the participants. There are also some participants who would like to exercise with music.

4 MOCK-UP STUDY

In a second step, a mock up study was done in order to evaluate attitudes and user experience of first designs of the interface and elements of the training program. Further, the mock-up study should reveal deeper insights into motivational gaming aspects of the training program presenting specific designs.

4.1 Methodology Mock up Study

Participants were a “sub-group” of the prior focus group study and therefore, they were again interested users of the training program recruited from the rural region in Upper Austria. After showing design elements and mock ups, we asked open questions about their first impressions towards these mock-up designs with regard to six different domains: interface design, design and appearance of the training (presentation of the training person), appearance of the avatar, voice of the avatar, motivation/gaming design and interaction/gestures.

4.2 Mock up Study Results

Seven participants (5 male, 2 female; mean age 65) took part in this study. All participants perceived the interface design to be clear. Readability and font size were satisfying to all participants. Only one male participant (14%) had further suggestions for the design of the menu buttons since he did not like the form of an arrow: he suggested a square form instead.

For the presentation of one’s own person in the training program preferences differed significantly. We presented three different design forms with and without the nature background.

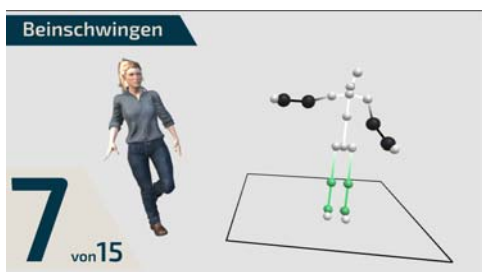


Figure 1: Person’s presentation design A.

There were two preferences (29%) for design A (Figure 1) and design B (Figure 2), respectively, and three preferences (43%) for design C (Figure 3).



Figure 2: Person’s presentation design B.

All participants had difficulties in correctly interpreting the meaning of the colours of the person’s presentation through all designs. Also the different sizes of the bullets of the persons’ presentation in design A was not clear for the participants. Through all designs there was no overall preference for the neutral grey background compared to the nature background.



Figure 3: Person’s presentation design C.

For the appearance of the avatar the participants had very different views. We presented younger and older avatars, as well as male and female ones. In general, three participants (43%) preferred a younger avatar (2:1/m:f) and four participants (57%) preferred an older avatar (2:2/m:f).

Concerning the avatar’s voice, we presented four different female and four different male voices related to rate of speaking. There was no distinct preference for a distinct voice but the participants clearly preferred a slow pace.

Since the Train and Win program should also increase the motivation of the older adults to exercise, the participants were asked about their impressions about five different designs for feedback presentation of the training course. No participants could interpret the meaning of these designs correctly: Nevertheless, three participants

(43%) preferred the landscape motivation design (Figure 4) because of the clear meaning of a progress in the training. Two participants (29%) found the idea of activated individual music after a successful training stage interesting.



Figure 4: Landscape Motivation.

Since the interaction of the users with the system in this training program will be based on gestures, we also presented four different possibilities for use of the program and interface to the participants. The gesture “Six Buttons” was clearly preferred by the majority of the participants (4; 57%). Here the users had six different menu boxes which they could select with their left or right hand and confirm by closing their fist.

5 DISCUSSION USER STUDIES

In contrast to published literature (Brox et al., 2013; Strand et al., 2014) and contrary to our expectations, gamification elements were refused by a majority of the participants in our study. The low technology usage in our participants was similar to some studies in literature: for example, Charness and Boot (2016) reported about only 10% of American older adults aged 65 and above who use game consoles, such as Playstation or Nintendo for example. According to De Schutter (2011), older adults played PC-based casual games such as puzzle games or digital versions of card/board games, since these games do not demand for a high cognitive effort of learning. As a consequence of few experiences with game consoles and other physical training related technologies, our participants expected a traditional physical training program related to their previous experiences regarding sports. Hence, comparison of training scores was also declined.

Further the high activity level of the participants of the focus group has to be considered with regard to the expectations for the training program as well as the rural area they live in which facilitates

outdoor social group activities and might be another aspect of explanation of the results of the discussion group. The results of the focus group show the diversity between older adults. Although all participants are from the same region and very similar in age, their attitudes, technology experiences and needs for a training program differ significantly and can only be addressed with a very individual training program and well adapted user interface design.

Individualization of design and exercises of the training was relevant for all participants and was already reported in similar studies (Skjæret et al., 2016; Uzor and Baillie, 2014). Uzor and Baillie (2014) also found a stimulating effect on motivation, if training process and progress were reported. The participants concluded that a physical training program should also include various aspects of a healthy lifestyle such as nutrition or psycho-hygiene. Furthermore, there was a need for a variety of exercises in order to keep motivation high.

Expectations concerning design of the representation of the own person in the training and appearance of the avatar varied a lot. Preferences regarding a female or male trainer should be respected for motivational reasons. Concerning the person’s representation in the program a long-term study could show whether these preferences consist over time. A limitation of our studies was that the participants could not experience the representation during an active training session. Thus, it could also be argued that imagination was impeded and the passive observation of the figure was not reliable enough. Furthermore, the presented user studies have limitations regarding the small sample sizes and the lack of geographical variation of the participants.

6 CONCLUSIONS

The reported studies aimed to assess users’ needs and requirements for a physical training program based on the Microsoft Kinect and an Avatar acting as a virtual trainer. Results of both studies show that the participants have very different ideas about the physical benefits of the exercises and expect improvement of various health related issues such as nutrition or psycho-hygiene. Since one of the objectives of the Train and Win project is to address and implement various health related aspects, these expectations of the participants will be met.

Focus group results and mock up tests clearly

showed that the participants refused gamification elements of the training program. Development of the training program has to consider the very traditional expectations of the participants towards the training and neglect typical exergaming elements such as competition between participants or graphical rewards.

Both user studies showed that attitudes, needs and technology experiences differ significantly among the participants. Consequently, some aspects of the training program, such as exercises, design or representation of the own person have to be individually adapted to ensure high user acceptance and use of the program.

Based on the results of these two studies, the technical system will be developed. Within the planned project, 30 participants will actively use the training program at home for eight weeks. Each training session will last about 30 minutes. An evaluation study is planned to measure the outcomes of the training regarding physical activity and well-being of the older adults.

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