This is the published version of a chapter published in *Building continents of knowledge in oceans of data: The future of co-created eHealth.*

N.B. When citing this work, cite the original published chapter.

Older Adults Co-Creating Meaningful Individualized Social Activities Online for Healthy Ageing

Madeleine BLUSI[a,b,1], Ingeborg NILSSON[b] and Helena LINDGREN[a]

[a]*Department of Computing Science, Umeå University, Sweden*
[b]*Department of Community Medicine and Rehabilitation, Umeå University, Sweden*

Abstract. Social isolation and loneliness among older people is a growing problem with negative effects on physical and mental health. In co-creation with older adults individualized social activities were designed where older adults through computer mediated communication were able to participate in social activities without leaving their homes. Four types of activities were designed; outdoor activity, music event, visiting a friend and leisure activity. A participatory action research design was applied, where end users together with scientists from two research fields developed, tested and evaluated online participation in the activities. Usability and safety of the systems were major concerns among older adults. The evaluation pointed out that level of simplicity, usability and audio-video quality determined the level of satisfaction with the human interaction during the activity, thereby affecting the meaningfulness of the activity. The research presented in this paper constitutes the first step in a long-term research process aiming at developing a digital coaching system that gives older adults personalized support for increasing participation in meaningful social activities.

Keywords. Co-creation, participatory action research, social activity, healthy ageing, computer mediated communication, personalization

1. Introduction

Systematic reviews show how social isolation and loneliness among older people is a substantial problem (affects 7-17% and 40% respectively) and that lack of social inclusion and a feeling of loneliness negatively effects physical and mental health [1]. These issues are especially prevalent in older people with health problems and are associated with socio-demographic factors (gender) and social factors (e.g., civil status and meaningful social contacts) [2]. Research findings call for attention to the provision of service for meeting societal ideals in caring for the older generation, confront rising isolation and subjective loneliness which harms individual health and burdens national and global economies [3]. Research has also over the past decades demonstrated the importance of social relations and social engagement for older people's health, well-being [4] and cognitive health [5]. Strong mortality effects also exist; in fact, loneliness induces mortality and disease at rates comparable to life style diseases such as smoking and exceeds that for obesity and inactivity. Participation in activities and social networks

---

[1] Corresponding Author, Madeleine Blusi, Department of Community Medicine and Rehabilitation, Umeå University, Sweden; E-mail: madeleine.blusi@umu.se.

often decrease in correlation with higher age. This is partly due to physical limitations that prevent people from leaving home to participate in social life [6].

This research aims to explore a participatory design methodology where older adults co-create and maintain person-adaptable meaningful social activities using web technology, as a means to prevent social isolation and loneliness, and that can be used as complementary health intervention to other interventions targeting older people. Key is allowing the older adults to take control over the content of the activities [7]. Aim of this research is to, in co-creation with older adults, develop and design a model for enabling online participation in individualized meaningful social activities.

The research presented in this paper constitutes the first step in a long-term research process aiming at developing a digital coaching system that gives older adults personalized support for increasing participation in meaningful social activities. The results will provide a compass for further development of a health support application targeting both physical and social, presented in [8]. The following research questions form the basis of the research: i) Which types of social activities do older adults wish to access in order to maintain or increase their involvement in meaningful, social activities? ii) How can these activities, when offered online, be designed to meet individuals' needs?

2. Methods

A participatory action research design was applied, where end users (older adults) together with computer science and occupational therapy researchers developed and tested meaningful online social activities. The activities should be personalized and tailored to the needs of each individual. The design was based on a user perspective, focusing on the user, the activity and the interaction. Through a co-design process and participatory action research the elderly together with researchers in the creation of activities and technology [9]. Three workshops were conducted with totally 14 older adults (five men and nine women, age 70 and older), exploring their opinions and desires in relation to the research questions. Field notes and discussions were analyzed using qualitative content analysis [10]. Four older adults participated in a subsequent pilot study, where they evaluated the created activities and the first prototypes that mediated each type of activity.

Computer Mediated Communication, CMC, was chosen as technical medium. CMC was performed synchronously with audio-video communication where geographically distantly located people held meetings in real-time [11]. The selected software was available free of charge and commonly used worldwide among families, businesses and organizations. It was chosen also because it allows the user to create multiple social meeting place very easily, which can be integrated in the digital coaching application in further development. For the pilot testing common equipment for accessing the web and social media was used. Simplicity was strived for and all participants used equipment they already had available, all older adults in their own homes used a laptop.

3. Results

During the workshops, partnership and working together in sharing knowledge and information was emphasized. The older adults were active participants, initiating topics they found significant and alternately leading the dialogues. The following topics were

brought forward and explored: "fears and expectations", "consequences of rejecting technology", "what is social activity", "what counts as meaningful" and "correlation between health and activity".

3.1. Fears and Expectations

Usability and safety of the systems were major concerns. Minimizing occurrence of anticipated technical issues was desired. Common application systems easily available on the web, with user friendly interface and low demand for user technology skills was desired. Fears as well as expectations were pointed out (Table 1).

Table 1. Examples of fears and expectations pointed out by older adults, concerning social activities online.

Fears	Expectations
Undesired appearance on public internet space	Having company
Others having unauthorized access to my activities	Someone to talk to
Uncertainty about who can see what I do online	Experience adventure
Technology difficulties:	Improve life situation for other older adults
- not knowing which buttons to push	Improve my skills as internet user
- making mistakes leading to destroying technology	Digital inclusion

3.2. Types of Social Activities Desired by Older Adults

The second workshop explored what types of social activities older adults wish to participate in to maintain or increase their involvement in meaningful social activities when their life situation prevent them from physically attending activities outside the home. Four types of activities were identified, listed and exemplified in Table 2.

Table 2. Types of meaningful social activities as identified by older adults.

Type of Activity	Examples of Activities
Outdoor activities	Hiking, picking berries, walking in the forest
Public arrangements	Social events arranged by the local church, attending music events
Visiting a friend	Read newspaper together, discuss news, have coffee, talk
Leisure activities	Splitting and stacking firewood, building things

3.3. Design of Activities and Mediating Technology

The different types of activities desired by older adults (Table 1) implied diversity regarding characteristics of inter-human interaction and served four types of motives: experiencing nature, experiencing cultural events together with people, nurturing relations, and conducting leisure activities where one can create things. These motives are at the core of the user model to be implemented for personalized coaching.

Engaging an external partner in design and execution was necessary for all types of activities, as each one required someone who would be the Remote Companion (RC) physically present in the remote location. Older adults who wanted to participate in outdoor activities remained in their homes, connected to the RC through CMC, while the RC was performing the activity on location.

The desired activities called for various social meeting points, where a variety of environmental factors needed consideration when selecting technology; a) quality of

Internet access, b) indoors/outdoors and weather conditions, c) lighting conditions and positioning of webcamera for video quality, d) microphone capacity and positioning for audio quality, e) noise management, f) choosing suitable device, for RC's transmission. Figure 1 overviews how activities in the pilot test were designed and set up.

Activity	Social companion		Environmental factors
	Location	Choice of device	
1. Hiking	🌲🌲☀	Tablet	Mobility - walking around Zooming - (berries and flowers)
2. Live music event	🏠	Laptop	Many attendants Musicians used sound system (loud volume in the room)
3. Visiting a friend	🏠	Laptop	One person Sitting at kitchen table Quiet surroundings

Figure 1. Examples and description of activities in pilot test.

3.4. Pilot Test and Evaluation

Purpose of the pilot test was to evaluate user experience of a) technology and b) participating in the selected activity from a distance, regarding quality factors audio, video and human interaction between older adults at home and RC. Experiences were graded using values; bad, not so good, good, very good or fluctuating (Table 3). All older adults enjoyed being able to participate in activities from their home but experiences varied. Visiting a friend was rated high on all factors by both participants. Hiking was rated as very good by the senior, while the RC experienced limitations in video function, related to user interface.

Music event at church was the most difficult regarding all tree quality factors and also generated the least satisfactory experience. The environment was challenging, primarily with regards to audio (crowd in the room and musicians' sound system). Also, the internet capacity was insufficient which caused problems for video quality.

Table 3. Older adults' (S) and remote companions' (RC) user experience of using the technology, software and quality factors audio, video and human interaction (HI).

User	Activity	Technology	Audio	Video	HI
S1	Hiking	easy to use	very good	very good	very good
S2	Music at church	easy to use	fluctuating	fluctuating	bad
S3+S4	Visiting a friend	easy to use	very good	very good	very good
RC1	Hiking	fluctuating	Good	fluctuating	good
RC2	Music at church	easy to use	Good	not so good	fluctuating

4. Discussion and Conclusions

Enabling social participation through simplified web technology is an essential step towards preventing social isolation and loneliness among older people, and to promote healthy ageing [12,13]. Co-created social activities where older adults through CMC

were able to participate in activities without leaving their homes were designed. Pilot testing and evaluation contributed with knowledge about user experiences of mediating online social activities for older adults through simple and commonly available web technology.

The results presented will provide a compass for further development of a digital coaching system offering older adults personalized support for increasing participation in meaningful social activities [8]. Conclusions: levels of usability and simplicity, in combination with the quality of basic functions of CMC, had essential impact on the quality of personal interaction during the activity, thus affecting the meaningfulness of the activity. All older adults found the technology simple to use which indicates that commonly available software can be suitable for activities targeted at older adults.

References

[1] A.P. Dickens, S.H. Richards, C.J. Greaves, J.L. Campell, Interventions targeting social isolation in older people: A systematic review, *BMC Public Health* **11** (2011), 647.
[2] L. Dahlberg, L. Andersson, K.J. McKee, C. Lennartsson. Predictors of loneliness among older women and men In Sweden: A national longitudinal study, *Aging and Mental Health* **5** (2015), 409-17.
[3] *Knowledge translation on ageing & health: A framework policy development 2012*, World Health Organization. Geneva, Switzerland, WHO Document Production Services, 2012.
[4] S. Ferlander, The importance of different forms of social capital for health, *Acta Sociologica* **50** (2007), 115-28.
[5] M.V. Zunzunegui, B.E. Alvarado, T. Del Ser, A. Otero, Social networks, social integration, and social engagement determine cognitive decline in community-dwelling Spanish older adults, *Journal of Gerontology: Social Sciences* **58** (2003), 93-100.
[6] I. Nilsson, E. Häggström Lundevaller, A.G. Fisher, The Relationship between Engagement in Leisure Activities and Self-Rated Health in Later Life, *Activities, Adaptation & Aging* **41** (2017), 175-190.
[7] H. Lindgren, Personalisation of Internet-Mediated Activity Support Systems in the Rehabilitation of Older Adults – A Pilot Study, *Aime 2009 International Workshop On Personalisation for e-Health* (2009), 20-27.
[8] R. Janols, E. Guerrero, L. Lindgren, A Pilot Study on Personalised Coaching to Increase Older Adults' Physical and Social Activities. In: ISAmI 2017: Ambient Intelligence – Software and Applications – 8th International Symposium on Ambient Intelligence (ISAmI 2017), *AISC* **615** (2017), 140-148.
[9] M. Truglio-Londrigan, Participatory action research: One researcher's reflection. In *Nursing Research Using Participatory Action Research Qualitative Designs and Methods in Nursing,* M. De Chesnay Editor, New York Springer, 2015.
[10] U.H. Graneheim, B. Lundman, Qualitative content analysis in nursing research: Concepts, prodedures and measures to achieve trustworthiness, *Nurse Education Today* **24** (2004), 105-112.
[11] M.S.L. Khan, *Presence through Actions, Theories, Concepts, and Implementations. Immersive Interaction Lab,* Doctoral dissertation, Department of Applied Physics and Electronics, Umea University, Sweden, Umea, 2017.
[12] M. Blusi, L. Kristiansen, M. Jong, Exploring the influence of Internet-based caregiver support on experiences of isolation for older spouse caregivers in rural areas: A qualitative interview study, *International Journal of Older People Nursing* **3** (2014), 211-220.
[13] M. Blusi, R. Dalin, M. Jong, The benefits of e-health support for older family caregivers in rural areas, *Journal of Telemedicine and Telecare* **20** (2014), 63-69.