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Negotiating Contradictions: Engaging Disparate Stakeholder Demands in Designing for Active and Healthy Ageing

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Abstract

Purpose: Designing technologies for active and healthy ageing (AHA) requires a subtle understanding of end users (primary stakeholders) and healthcare professionals (secondary stakeholders). Often, their perspectives can be heterogeneous and contradictory. Identifying and negotiating them may be a challenge for designers. This study presents our approach to understanding and negotiating contradictory stakeholder perspectives when designing AHA technologies for older adults.

Design/methodology/approach: We conducted an exploratory interview study with fifteen community-dwelling older adults and eleven healthcare stakeholders, including doctors, health insurance agencies, policymakers, and caregivers. We analyzed the interview material and negotiated contradictory perspectives.

Findings: Three major issues among stakeholders emerged: (1) perspectives on AHA; (2) perceived benefits and drawbacks of AHA technologies; and (3) concerns about data privacy, control, and trust.

Research limitations/Implications: Our results show the heterogeneity and contradictions in stakeholder perspectives on AHA technologies and how these perspectives may be negotiated. This could help understand and facilitate long-term use of AHA technologies among older adults.

Originality/Value: This study alerts researchers to contradictory perspectives among older people and healthcare stakeholders and the importance of involving them in the design of AHA technologies.

Author keywords: ICT; active healthy ageing; mobile technologies; older people; design; qualitative study.

1 INTRODUCTION

Policymakers and healthcare professionals alike are interested in approaches that can help delay the need for healthcare services, prolong independent living, and support older people's well-being. In research and practice, active & healthy ageing (AHA) has become an acknowledged term to summarize these aspects (Publications Office of the European Union, 2012; Rechel u. a., 2013; Vines, Pritchard, Wright, Olivier, & Brittain, 2015). Researchers and technology developers have responded to the challenge of prevention and health for older adults with smart AHA technologies like wearables, smartphones, or similar sensors that aim to monitor user behavior (Haluza & Jungwirth, 2015; Stellefson u. a., 2015). Such AHA technologies enable digital health services like tele-monitoring, remote health services, or self-monitoring (Aceros, Pols, & Domènech, 2015; Publications Office of the European Union, 2012).

Even though these modern AHA technologies may be more convenient than older ones, many older people who begin to use them stop using them soon after. This creates a need for research into what may improve the sustainability of such systems (Di Pasquale, Padula, Scala, Biocca, & Paraciani, 2013; Jarman, 2014). Part of the problem is that the utility of AHA technologies seems to be considerably affected by older people's social environment. Secondary stakeholders like doctors, caregivers, or health insurance companies often have perspectives and goals that conflict with those of older people. Thus, it seems that continuous adoption of AHA technologies depends not just on good technical design and willing users, but also on users' interactions with secondary stakeholders.

Current literature rarely considers the interrelations between older people and secondary stakeholders in the design of AHA technologies (Fitzpatrick & Ellingsen, 2013). We argue that these interrelations strongly influence older people's perceived utility of AHA technologies. This article presents results from an exploratory interview study conducted with older people (end users) and a range of secondary stakeholders. We aimed to identify, analyze and negotiate perspectives of end users and secondary stakeholders which are relevant for the design of AHA technologies. The results show important contradictions, commonalities and interactions in end user and stakeholder perspectives and suggest how to integrate them in the design process.

2 METHODS

2.1 *Research setting and data collection*

The study is part of the European research project MY-AHA, whose goal is a technology-based health platform for end users (primary stakeholders) and secondary stakeholders. The platform will combine various health devices and software applications that support older people with AHA, for instance, by monitoring their activity or nutrition and enabling remote health services, like telemedicine. From previous projects we learned that the success of such AHA technologies requires thorough consideration of both primary and secondary stakeholders (Andersen, Bjørn, Kensing, & Moll, 2011; Chen, Ngo, & Park, 2013; Ogonowski u. a., 2016). Therefore, we contacted both primary and secondary stakeholders in Germany by telephone and email and asked for interviews about their perspectives on using AHA technology. Primary stakeholders were recruited from a pool of senior organizations around the city of Siegen. Secondary stakeholders were recruited by approaching individual health institutions, doctors and caregivers in Siegen's proximity. The sampling strategy for primary end users aimed to represent the diversity of health, gender, computer literacy, and social connectedness among older people. The sampling strategy for secondary stakeholders aimed for a wide range of healthcare professionals, to depict the variety of ideas in the healthcare system. The interviews included questions on prevention, health, and technology. In total, we conducted 26 interviews with primary end users and secondary stakeholders. Fifteen primary end users with an average age of 76 years were interviewed, of which nine were female and six were male.

Based on self-reports, half of the participants were physically fit, while the other half reported being impaired to some extent. Regardless of their self-reported health status, our study included only older adults who lived independently in their homes. To assess end users' computer literacy, we asked about their experience with modern technologies such as smartphones, personal computers, or tablet computers. If participants used at least one of these technologies regularly, we classified them as experienced. Otherwise, we classified them as novices (11 experienced users and 4 novices). In general, older people in our study were inexperienced with AHA technologies. However, older people with higher computer literacy often had heard of such technologies before. As an indicator for social isolation,

we asked participants whether they lived with someone or alone. However, it is important to note that social isolation is defined not just by household size, but also by other factors, like contact with friends and social support. Ten participants lived with someone and five participants lived alone, as shown in Table 1. Due to health issues, participant number 8 (PN8) dropped out prior to the interviews.

<i>ID</i>	<i>Sex</i>	<i>Age</i>	<i>IT-literacy</i>	<i>Physical status</i>	<i>Marital status</i>
PN 1	Male	74	Experienced	Fit	Lives with partner
PN 2	Female	75	Experienced	Fit	Lives alone
PN 3	Female	71	Experienced	Fit	Lives with partner
PN 4	Male	71	Experienced	Fit	Lives with partner
PN 5	Female	78	Novice	Impaired	Lives alone
PN 6	Female	81	Novice	Impaired	Lives alone
PN 7	Male	72	Experienced	Fit	Lives with partner
PN 8	Male	71	Novice	Impaired	Lives with partner
PN 9	Female	74	Experienced	Impaired	Lives with partner
PN 10	Male	78	Experienced	Fit	Lives with partner
PN 11	Female	90	Novice	Impaired	Lives with son
PN 12	Female	85	Experienced	Impaired	Lives alone
PN 13	Female	75	Experienced	Impaired	Lives with partner
PN 14	Female	83	Novice	Fit	Lives alone
PN 15	Male	68	Experienced	Fit	Lives with partner
PN 16	Male	64	Experienced	Fit	Lives with partner

Note: PN, participant number

Table 1: Characteristics of study participants.

Interviews with primary end users were conducted in their homes to provide a familiar, non-artificial situation. The interviews lasted 50 minutes on average, followed a semi-structured guideline, and were conducted by two researchers. One researcher led the interview, while the other researcher took notes and observed. All interviews were audio-recorded. We asked participants questions such as how much they valued a healthy lifestyle, what motivated them to take preventive measures, how much they valued social contacts, and what concerns and opportunities they saw in technology use and health data storage.

We conducted eleven interviews with representatives of seven different types of organization operating within the German healthcare system. Our sample included representatives of one AHA technology supplier company, one health insurance company (HIC), two policymakers working at the town council of Siegen, three physiotherapists,

one NGO, two medical doctors, and one caregiver. We led semi-structured interviews with secondary stakeholders at a location of their choosing, typically their place of work. Interviews were carried out by two researchers and lasted about 50 minutes on average. All interviews with secondary stakeholders were audio-recorded. We asked secondary stakeholders about the importance of preventive healthcare for older adults and how to improve it, how they motivated older adults to adopt or maintain healthier lifestyles, and what concerns and opportunities they saw in technology use and health data storage for professional health services.

There was no direct relationship between the primary and secondary end users in our study. However, older people in our sample received health services from healthcare professionals of similar organizations. The group of secondary stakeholders did not include AHA service providers or retailers.

2.2 Data analysis approach

The qualitative data from audio records and text notes made during the interviews was analyzed using a thematic analysis approach (V. Braun & Clarke, 2006). Trained research associates transcribed all audio-recorded interviews. Based on the transcripts, four trained coders performed an inductive analysis of the data and generated main categories. Coding discrepancies were discussed and eliminated by adding, editing or deleting codes, based on the group discussion outcomes. The final coding system covered categories relating to the perception of health, the motivation for prevention initiatives, perceived usefulness and drawbacks of AHA technologies, data privacy, trust, as well as control over data and technologies. Based on the coded data, we derived different primary end user and secondary stakeholder perspectives on prevention, health, and technology. For the analysis, the coders used the software application MAXQDA.

3 FINDINGS

3.1 *Perspectives on active and healthy ageing*

While definitions of active and healthy ageing vary, participants in our study consistently highlighted four components: (1) social participation; (2) physical activity; (3) nutrition; and (4) sleep. Both primary and secondary stakeholders shared perspectives on social participation and physical activity, but their perspectives on nutrition and sleep were rather different.

Agreement on physical activity & social participation

Our study showed that older people and secondary stakeholders mostly relate AHA to physical activity and social participation. Older people understand AHA as a convenient means to maintain social contacts, and they would welcome technology that helps them to stay healthy longer and thereby promotes social participation: *“Well, I need social contacts! [...] This is why I want to stay in my own home as long as possible, and of course, I appreciate any technology that can help me stay healthy longer [...].”* (PN 12, female, 85 years).

Secondary stakeholders shared these perspectives and emphasized the importance of social participation and physical activity from a professional point of view: *“Physical activity and social participation have a strong correlation. If someone lives alone at home, you can see that he takes considerably less care of his physical health. [...]”* (Doctor).

Disagreements on nutrition

Both older people and secondary stakeholders understand nutrition as an important factor for AHA. However, their perspectives on what healthy nutrition ought to look like differ considerably. For instance, older people mentioned how important it was for them to enjoy food. Many wanted eating to stay pleasurable and thought that healthy nutrition conflicted with this desire: *“Of course, healthy nutrition is important to me. However, it clearly contradicts my lust for food. [...]”* (PN 7, male, 72 years).

Additionally, some remarked that they did not appreciate recommendations regarding food and nutrition, as they felt patronized: *“Yes, it [healthy nutrition] has a specific importance. However, it is not so important to me that I would allow someone to tell me what to eat and*

what not. I don't like to be patronized" (PN 1, male, 74 years). This stands in stark contrast to perspectives of secondary stakeholders, who shared the opinion that many older people lacked the physical and cognitive capabilities to eat in a healthy manner and required more guidance and support for healthy cooking and nutrition: "Yes indeed, [...] with age, capabilities to cook properly every day decrease. We could do more here. For example, collaborative cooking communities or support and guidance from professionals." (Care-giver).

Thus, while the secondary stakeholders insisted that AHA system design must focus on nutrition, the primary end users expressed reservations. We saw that while there are clear and important factors for AHA from a clinical perspective, the experiential nature of these aspects of daily life often put the two stakeholder groups in conflict.

3.2 Benefits and drawbacks of AHA technology use

Potential long-term use of AHA technologies requires that the solutions offer benefits and usefulness from all stakeholder perspectives. Our study showed that both primary end users and secondary stakeholders easily agreed on benefits of AHA technology. While agreeing on some of the drawbacks, however, they disagreed on others.

Agreement on benefits

An important factor that primary end users and secondary stakeholders agreed on was security. Some older people saw prevention of physical harm as a benefit of the technology: *"If I had a device that warns me when I should pay attention to my environment, that would be great!" (PN 5, female, 78 years). Secondary stakeholders also agreed that technology can prevent physical harm and provide support against disorientation and helplessness. "Technology might be useful in situations where they cannot decide on their own anymore or when they lose orientation and wander around." (NGO).*

Agreement on drawbacks

Yet technology was not universally accepted, and with good reason. Many of the older participants were cautious about using AHA technologies, as they feared it could lead to their being controlled by technologies, institutions, or other people and losing their independence. *"No! For God's sake, that's terrible. I already said I don't want to live a life that is controlled by other people. I don't want to be ruled by machines. I think you've*

got to be very careful [...]. Because we are used to living independently.” (PN 2, female, 75 years). Given the obvious potential of collecting personal health data and the sheer scale of access to the intimate daily functioning of older adults, secondary stakeholders agreed that data leaks and unauthorized control could be risks and wished for clear limits to avoid external control by institutions or other people: *“There have to be ethical limits. No one wants to be externally controlled. I am very concerned about that.” (NGO).*

Alongside concerns about external control, many of our older participants were also worried that it might lead them to rely too much on the data and recommendations provided by the technologies. Health systems can produce convenient data about sleep or walking habits, but many crucial activities would remain unmeasured and could become neglected: *“[...] I would have a problem with controlling myself all the time. I would be concerned with data about my health most of the time. It could irritate me easily, for instance, if it tells me my pulse is too high and I would not know what it means or what to do. [...].” (PN 4, male, 71 years).* Despite the excitement around health data, secondary stakeholders also shared the concern that older people could focus too much on technology and stop listening to natural body signals: *“[...] you know what I mean. If in the end, my self-awareness suffers, because I can only tell how I feel by looking at the screen, something is wrong. It is a very thin line.” (Physiotherapist).*

Disagreements on drawbacks

End user participants expressed considerable interest in gaining access to, understanding and using information to improve their health literacy (defined by the World Health Organization (WHO) as the cognitive and social skills of a person, which determine their motivation and ability to gain access to, understand and use information in ways which promoted and maintained good health (WHO, 2018). Older adults expressed the expectation of using technology to collect and use information: *“[...] I would use technology to gather more information on a healthy lifestyle and health in general.” (PN 10, male, 78 years).* Some thought this could also strengthen their position in interactions with healthcare professionals.

Despite the clear support for health literacy in recent EU policy statements, secondary stakeholders disagreed about the value of increased health literacy. For example, doctors

and physiotherapists feared older people's increased resistance to advice, which could harm professional health services: *"It is like you ask Dr. Google all the time. It is not good when people rely on their apps or the information on the Internet more than on their doctor's advice."* (Physiotherapist).

We found perhaps the strongest disagreement around one of the most common software features – reminders. Secondary stakeholders anticipated improved communication with professionals and patients and the possibility of sending reminders to their patients: *"Inter-connection is important! For instance, if I want to share information with my team or patients, I could create a virtual communication space. I would be able to remind them frequently, like five times a day, to take care of things."* (Physiotherapist). In contrast, primary end users explicitly stated that they were not fond of receiving reminders. In fact, the reaction was often so negative that it became a barrier to their using these technologies: *"I find it extremely annoying when I get notifications or recommendations what to eat, when I should stop eating or when I should change my diet, or when it tells me I gained a bit of weight. I know these things myself. [...]"* (PN 15, male, 68 years).

3.3 Data privacy, control and trust

All primary end users in our study had major concerns about sharing their health data with HICs, mainly because they feared increased health insurance contributions: *"When you talk about health-related data, privacy is much more important than for other types of data. Sharing health-related data with health insurance agencies etc. can cause you harm."* (PN 15, male, 68 years).

Noticeably, many secondary stakeholders, especially doctors, shared these concerns: *"I think it is very important; there is a high risk of data abuse and increased health insurance contributions when sharing health data with health insurance companies."* (Doctor). Besides, it seemed that many of the concerns about data privacy were also fueled by and derived from the media: *"If you look at the media in the last two years, you see how private data is being abused and where you can buy all this data! [...]"* (Policymaker).

Another important factor for trust seems to be the level of computer literacy, as it influences people's understanding of health data collection processes: *"I am quite sensitive in this area [personal data]. I hardly upload personal data on the Internet, because I do not know*

and do not understand who uses the data and what happens with it.” (PN 1, male, 74 years).

Despite their admitted lack of computer literacy, many end users demanded control over which health data they shared: “[Data] transfer? Yes, but under the condition that I am asked for permission up front. The owner of the data should decide whether they may be transferred or not. I expect that to be sorted out before I use such technologies.” (PN 4, male, 71 years).

This need was keenly understood by many of the secondary stakeholders, who argued for increased transparency of health data processing: “[To trust in the technology] it would take crystal-clear, transparent structures on how data is being handled.” (Caregiver). Policymakers expressed significant support for giving older people more control over their health data: “[...] and people should have the possibility to inform themselves and decide whether they want that [sharing health data] or not.” (Policymaker).

Recapitulating section 3, our results suggest that older people and secondary stakeholders, at least to some degree, seem to have different conceptions of independence (mentioned with respect to reminders in section 3.2) and well-being (mentioned with respect to nutrition in section 3.1). How these differing conceptions, as well as trust and data privacy might affect and influence the design of AHA technologies, will be discussed in the following section.

4 DISCUSSION

Our results suggest that there were considerable differences of opinion between the two groups of participants on various issues. It seemed that these differences may have been rooted in fundamentally different understandings of underlying concepts such as “independence” and “well-being. While both groups agreed on the importance of independence and well-being, many of the disagreements seemed to stem from these different understandings. Most current research on the design and development of AHA technologies concentrates on either primary end users or secondary stakeholders, but little attention (Fritz, Huang, Murphy, & Zimmermann, 2014; Gerling, Mandryk, & Linehan, 2015; Schorch, Wan, Randall, & Wulf, 2016; Uzor & Baillie, 2014) appears to have been given to whether stakeholders have a common understanding about these terms. Our study suggests that it is vitally important to expose what could otherwise be described as ‘deceptive agreement

In the following, we discuss the deceptive agreement and sources of disagreements around independence and well-being. We then consider how these can be negotiated when designing AHA technologies and which political and infrastructural requirements are necessary for the sustainable introduction of such technologies into the healthcare system.

4.1 Conceptions of independence

Our primary and secondary stakeholders agreed on supporting independence as a major motivation for health promotion and disease prevention. However, we found significant disagreement about health literacy use of technology by professionals to send reminders to end users. These disagreements, we argue, stem from differing notions of independence, which makes the participants’ agreement deceptive.

4.1.1 Health literacy

Improvements in health literacy are supported by EU policy (Kickbusch, Pelikan, Apfel, Tsouros, & World Health Organization, 2013), and these policy goals seemed to match the attitudes of older adults in our study. They saw health literacy as essential to their sense of independence. They wished to understand check-up procedures and their outcomes, and to have the option of demanding alternative procedures in case of doubt. They therefore saw health literacy as a way to move from being passive recipients of medical instructions to

active involvement in their own health. As Lorenzen-Huber et al. (2011) found, older people do not want to be monitored objects, but desire to be treated as equals (Lorenzen-Huber, Boutain, Camp, Shankar, & Connelly, 2011).

There was concern among secondary stakeholders, such as caregivers, physiotherapists, or doctors, about the sources of health literacy. They worried about older people's increased resistance to medical advice, which was also due to inaccurate information on the internet and professionals' inability to control the quality of information their patients accessed. Medical information on the internet is often false or ambiguous (Fahy, 2014). Our results indicate that doctors worried their work would become more complicated if older people received misinformation from internet or other unregulated sources of information. Both the medical doctors who took part in the study insisted that it was important for older people to accept guidance and did not see any conflict with maintaining their independence.

When designing AHA technologies, the challenge lies in addressing such needs and concerns. Technology could be used to enable eye-level collaboration between older people and professionals. For instance, healthcare professionals could send personalized health information to their patients' health devices or applications on demand, rather than older adults relying on information from the Internet.

4.1.2 Reminders – feature or problem?

Another source of disagreement between primary and secondary stakeholders were reminders – a common feature of all AHA technologies. Many participants were not very fond of this feature. They understand the intention and the ostensible promotion of healthy behavior. Yet they also saw constant reminders about what or when to eat as patronizing and a challenge to their independence. Older adults were sensitive to and wanted control over the frequency and content of reminders. They saw reminders as an intrusion that questioned their abilities with overly formal conceptions of healthy behavior.

In contrast, most secondary stakeholders saw reminders as a useful tool to make their work more efficient. They said they would use them frequently to influence their patients' behavior and saw reminders as a means to support older adults and help maintain their independence. To the healthcare professionals, reminders were a way to mitigate their own distrust in the ability of older adults to observe medical standards of healthy living. Here

independence was understood as consistent performance of rote tasks, with reminders used for behavioral modification if necessary.

The implications of these findings for designers is a challenge to provide a compromise between functionality and user acceptance. While reminders can be useful for older people, we learned that it was important to: (1) limit professionals' ability to deliver them at any time; and (2) take into account older people's sensitivity towards the frequency and contents of such reminders. For instance, AHA technologies should at least provide options to enable, disable, or restrict reminders and give older people more control. Ideally, reminders could be customized to individual preferences and personalities of the end users (Smith, Dennis, & Masthoff, 2016). After all, frequency, presentation and content are highly individual factors and determine whether reminders are seen as useful or annoying (Bailey, Konstan, & Carlis, 2001; Goldstein u. a., 2014; Haberer u. a., 2012). These points require collaboration between primary/secondary stakeholders and designers, to find the right mix of functionality, personalization, and control.

4.2 Differing conceptions of well-being

Well-being is an important factor, but we observed that primary and secondary stakeholders partly disagree on the definition. Secondary stakeholders mainly associate well-being with measurable physical and cognitive health, e.g., data on physical activity or nutrition. They tend to focus on older people's deficiencies and on prevention or intervention. In contrast, older people associate well-being with living well (social participation, independence, self-determination) rather than adherence to medical advice. There is no medical doubt that nutrition, sleep, or physical activity are major factors for individual health. Technology supports convenient monitoring of nutrition intake, sleep patterns, and physical activity. The resulting measures of healthy behavior are interpreted as evidence of well-being.

Yet, well-being is not necessarily a result of healthy behavior, but an individual, subjective feeling. Most current AHA technologies follow the same pattern and provide prevention and intervention measures, like activity or nutrition monitoring, with the stated intention of improving older people's well-being. Older adults in our study, however, insisted that well-being came from enjoyable activities, even if these were clearly not healthy. To them,

no amount of healthy nutrition could substitute for the joy of a shared meal, even if unhealthy. Here we see the distinction between measured and experiential conceptions of well-being. It also seems that healthcare professionals, at least in our study, hold stereotypes of older people's behaviors, such as diet. Designers should aim to find a balance between older people's personal choices and the demands of healthcare professionals. They should aim to prevent prejudices from affecting the design and viability of AHA technologies. This might increase the chance of older people integrating our AHA technologies into their daily routines.

4.3 Determinants of trust in AHA technologies

Control and trust are important to older people when asked about AHA and technology use (M. T. Braun, 2013; Heart & Kalderon, 2013; Lee, Myrick, D'Ambrosio, Coughlin, & de Weck, 2013; Miller & Bell, 2012; Morris & Venkatesh, 2000). Our study indicates that older people's trust in AHA technologies may strongly depend on the reputation of secondary stakeholders. Older people were willing to use new AHA technologies under the condition that collected health data was processed transparently and only by trusted secondary stakeholders, like physicians. The recent increase in cyber-attacks on older adults may have contributed to their distrust in health data collection (Martin & Rice, 2013; usatoday, 2018).

Furthermore, the adversarial relationship between primary end users and secondary stakeholders on the one hand and HICs on the other also seemed to cause considerable distrust. While end users and physicians depended on HIC coverage for healthcare products and services, HICs aim to minimize expenditures. Since these goals often conflicted, data sharing may be seen as too invasive. Older people may have been concerned that HICs could increase their contributions, if data on their 'unhealthy' behavior was made available. Our findings suggest that some secondary stakeholders indeed want to further exploit health data. However, our data also shows that older people may overestimate the abilities of HICs to exploit their personal health data. We as designers see a wide gulf of distrust that must be overcome, but we also see that AHA technologies need to give older people more control over their data.

We also found that older people's choice to use AHA technologies seems to be heavily influenced by recommendations from healthcare professionals. Cimperman et al. (2013) also found recommendations from relatives, friends, or professionals to have a major influence on older people's trust in technology (Cimperman, Brenčič, Trkman, & Stanonik, 2013). It is also important that healthcare professionals see AHA technologies as improving their services and providing health benefits to older people. This would increase their likelihood of recommending AHA technologies to their patients.

5 LIMITATIONS

These findings are not valid for all primary end users and secondary stakeholders in all the healthcare systems in Europe. They represent individual perspectives on AHA and technology use. Our findings do suggest that careful consideration of all relevant primary end user and secondary stakeholder perspectives is key to designing successful AHA technologies.

Also, our exploratory interview study did not bring together primary end users and secondary stakeholders in the same place. Bringing the stakeholders together might have led to additional implications. Our findings suggest the need for a moderating role to identify divergent stakeholder perspectives on AHA technology design.

Finally, we emphasize that this paper presents contradictions between older adults and other stakeholders on AHA technologies. However, these contradictions also showed that the notion of AHA depends on individual views and subjective standards, which should be investigated in future research.

6 CONCLUSION

Designers of information and communications technology (ICT) for AHA should aim to fully understand all relevant stakeholders to design and develop meaningful solutions for long-term AHA support. Finding a systematic approach, however, may be a challenge for researchers in this field, especially with respect to pre-existing trust relationships between older people and secondary stakeholders, increased data privacy concerns, and different conceptions of core AHA concepts, like independence and well-being. At the same time, we need the legal framework and infrastructure to introduce such technologies into the healthcare systems. While we designers cannot make laws, we can develop meaningful AHA concepts and solutions for end users. Our exploratory study revealed several contrasts and contradictory understandings between primary and secondary stakeholders. We believe that our findings alert researchers to the importance of involving all stakeholders and illustrate how to draw design lessons from contradictory perspectives.

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REFERENCES

- Aceros, J. C., Pols, J., & Domènech, M. (2015). Where is grandma? Home telecare, good aging and the domestication of later life. *Technological Forecasting and Social Change*, (93), 102–111. <https://doi.org/10.1016/j.techfore.2014.01.016>
- Andersen, T., Bjørn, P., Kensing, F., & Moll, J. (2011). Designing for collaborative interpretation in telemonitoring: Re-introducing patients as diagnostic agents. *International Journal of Medical Informatics*, 80(8), e112–e126. <https://doi.org/10.1016/j.ijmedinf.2010.09.010>
- Bailey, B. P., Konstan, J. A., & Carlis, J. V. (2001). The effects of interruptions on task performance, annoyance, and anxiety in the user interface. In *Proceedings of INTERACT* (Bd. 1, S. 593–601). Citeseer.
- Braun, M. T. (2013). Obstacles to social networking website use among older adults. *Computers in Human Behavior*, 29(3), 673–680. <https://doi.org/10.1016/j.chb.2012.12.004>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Chen, Y., Ngo, V., & Park, S. Y. (2013). Caring for caregivers: designing for integrality. In *Proceedings of the 2013 conference on Computer supported cooperative work* (S. 91–102). ACM Press. <https://doi.org/10.1145/2441776.2441789>
- Cimperman, M., Brenčič, M. M., Trkman, P., & Stanonik, M. de L. (2013). Older Adults' Perceptions of Home Telehealth Services. *Telemedicine and E-Health*, 19(10), 786–790. <https://doi.org/10.1089/tmj.2012.0272>

- Di Pasquale, D., Padula, M., Scala, P. L., Biocca, L., & Paraciani, N. (2013). Advancements in ICT for healthcare and wellbeing: towards Horizon 2020. In *Proceedings of the Fifth International Conference on Management of Emergent Digital EcoSystems* (S. 353–358). ACM Press.
<https://doi.org/10.1145/2536146.2536201>
- Fahy, E. (2014). Quality of patient health information on the internet: reviewing a complex and. *Australasian Medical Journal*, 7(1), 24–28.
<https://doi.org/10.4066/AMJ.2014.1900>
- Fitzpatrick, G., & Ellingsen, G. (2013). A Review of 25 Years of CSCW Research in Healthcare: Contributions, Challenges and Future Agendas. *Computer Supported Cooperative Work (CSCW)*, 22(4–6), 609–665. <https://doi.org/10.1007/s10606-012-9168-0>
- Fritz, T., Huang, E. M., Murphy, G. C., & Zimmermann, T. (2014). Persuasive Technology in the Real World: A Study of Long-term Use of Activity Sensing Devices for Fitness. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (S. 487–496). New York, NY, USA: ACM.
<https://doi.org/10.1145/2556288.2557383>
- Gerling, K. M., Mandryk, R. L., & Linehan, C. (2015). Long-Term Use of Motion-Based Video Games in Care Home Settings. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems* (S. 1573–1582). New York, NY, USA: ACM. <https://doi.org/10.1145/2702123.2702125>
- Goldstein, C. M., Gathright, E. C., Dolansky, M. A., Gunstad, J., Sterns, A., Redle, J. D., ... Hughes, J. W. (2014). Randomized controlled feasibility trial of two

- telemedicine medication reminder systems for older adults with heart failure. *Journal of Telemedicine and Telecare*, 20(6), 293–299.
<https://doi.org/10.1177/1357633X14541039>
- Haberer, J. E., Robbins, G. K., Ybarra, M., Monk, A., Ragland, K., Weiser, S. D., ... Bangsberg, D. R. (2012). Real-Time Electronic Adherence Monitoring is Feasible, Comparable to Unannounced Pill Counts, and Acceptable. *AIDS and Behavior*, 16(2), 375–382. <https://doi.org/10.1007/s10461-011-9933-y>
- Haluza, D., & Jungwirth, D. (2015). ICT and the future of health care: aspects of health promotion. *International Journal of Medical Informatics*, 84(1), 48–57.
<https://doi.org/10.1016/j.ijmedinf.2014.09.005>
- Heart, T., & Kalderon, E. (2013). Older adults: Are they ready to adopt health-related ICT? *International Journal of Medical Informatics*, 82(11), e209–e231.
<https://doi.org/10.1016/j.ijmedinf.2011.03.002>
- Jarman, H. (2014). Incentivizing health information exchange: collaborative governance, market failure, and the public interest. In *Proceedings of the 15th Annual International Conference on Digital Government Research* (S. 227–235). ACM Press. <https://doi.org/10.1145/2612733.2612766>
- Kickbusch, I., Pelikan, J. M., Apfel, F., Tsouros, A. D., & World Health Organization (Hrsg.). (2013). *Health literacy: the solid facts*. Copenhagen: World Health Organization Regional Office for Europe.
- Lee, C., Myrick, R., D'Ambrosio, L. A., Coughlin, J. F., & de Weck, O. L. (2013). Older Adults' Experiences with Technology: Learning from Their Voices. In C. Stephanidis (Hrsg.), *HCI International 2013 - Posters' Extended Abstracts*:

- International Conference, HCI International 2013, Las Vegas, NV, USA, July 21-26, 2013, Proceedings, Part I* (S. 251–255). Berlin, Heidelberg: Springer Berlin Heidelberg. Abgerufen von http://dx.doi.org/10.1007/978-3-642-39473-7_51
- Lorenzen-Huber, L., Boutain, M., Camp, L. J., Shankar, K., & Connelly, K. H. (2011). Privacy, Technology, and Aging: A Proposed Framework. *Ageing International*, 36(2), 232–252. <https://doi.org/10.1007/s12126-010-9083-y>
- Martin, N., & Rice, J. (2013). Spearing High Net Wealth Individuals: The Case of Online Fraud and Mature Age Internet Users. *International Journal of Information Security and Privacy*, 7(1), 1–15. <https://doi.org/10.4018/jisp.2013010101>
- Miller, L. M. S., & Bell, R. A. (2012). Online Health Information Seeking: The Influence of Age, Information Trustworthiness, and Search Challenges. *Journal of Aging and Health*, 24(3), 525–541. <https://doi.org/10.1177/0898264311428167>
- Morris, M. G., & Venkatesh, V. (2000). AGE DIFFERENCES IN TECHNOLOGY ADOPTION DECISIONS: IMPLICATIONS FOR A CHANGING WORK FORCE. *Personnel Psychology*, 53(2), 375–403. <https://doi.org/10.1111/j.1744-6570.2000.tb00206.x>
- Ogonowski, C., Aal, K., Vaziri, D., Rekowski, T. V., Randall, D., Schreiber, D., ... Wulf, V. (2016). ICT-Based Fall Prevention System for Older Adults: Qualitative Results from a Long-Term Field Study. *ACM Trans. Comput.-Hum. Interact.*, 23(5), 29:1–29:33. <https://doi.org/10.1145/2967102>
- Publications Office of the European Union. (2012). *Redesigning Health in Europe for 2020* (eHealth Task Force Report). Belgium: European Commission. Abgerufen von

- com.de/fileadmin/user_upload/dateien/Downloads/redesigning_health-eu-for2020-ehf-report2012_01.pdf
- Rechel, B., Grundy, E., Robine, J. M., Cylus, J., Mackenbach, J. P., Knai, C., & McKee, M. (2013). Ageing in the European Union. *The Lancet*, *381*(9874), 1312–1322. [https://doi.org/10.1016/S0140-6736\(12\)62087-X](https://doi.org/10.1016/S0140-6736(12)62087-X)
- Schorch, M., Wan, L., Randall, D. W., & Wulf, V. (2016). Designing for Those Who Are Overlooked: Insider Perspectives on Care Practices and Cooperative Work of Elderly Informal Caregivers. In *Proceedings of the 19th ACM Conference on Computer-Supported Cooperative Work & Social Computing* (S. 787–799). New York, NY, USA: ACM. <https://doi.org/10.1145/2818048.2819999>
- Smith, K. A., Dennis, M., & Masthoff, J. (2016). Personalizing Reminders to Personality for Melanoma Self-checking. In *Proceedings of the 2016 Conference on User Modeling Adaptation and Personalization* (S. 85–93). New York, NY, USA: ACM. <https://doi.org/10.1145/2930238.2930254>
- Stellefson, M., Alber, J. M., Wang, M. Q., Eddy, J. M., Chaney, B. H., & Chaney, J. D. (2015). Use of Health Information and Communication Technologies to Promote Health and Manage Behavioral Risk Factors Associated With Chronic Disease: Applications in the Field of Health Education. *American Journal of Health Education*, *46*(4), 185–191. <https://doi.org/10.1080/19325037.2015.1043064>
- usatoday. (2018). More fraudsters are scamming senior citizens through technology — and it’s costing them millions. Abgerufen 15. November 2018, von <https://www.usatoday.com/story/money/personalfinance/2018/03/17/more->

- fraudsters-scramming-senior-citizens-through-technology-and-its-costing-them-millions/428406002/
- Uzor, S., & Baillie, L. (2014). Investigating the Long-term Use of Exergames in the Home with Elderly Fallers. In *Proceedings of the 32Nd Annual ACM Conference on Human Factors in Computing Systems* (S. 2813–2822). New York, NY, USA: ACM. <https://doi.org/10.1145/2556288.2557160>
- Vines, J., Pritchard, G., Wright, P., Olivier, P., & Brittain, K. (2015). An Age-Old Problem: Examining the Discourses of Ageing in HCI and Strategies for Future Research. *ACM Transactions on Computer-Human Interaction*, 22(1), 1–27. <https://doi.org/10.1145/2696867>
- World Health Organization. (2018). WHO | Track 2: Health literacy and health behaviour. Abgerufen 15. November 2018, von <http://www.who.int/healthpromotion/conferences/7gchp/track2/en/>