Can a service robot which supports independent living of older people disobey a command?

Bedaf, Sandra; Draper, Heather; Gelderblom, Gert-Jan; Sorell, Tom; de Witte, Luc

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Can a service robot which supports independent living of older people disobey a command? The views of older people, informal carers and professional caregivers on the acceptability of robots.

Sandra Bedaf[1,2], Heather Draper[3], Gert-Jan Gelderblom[1], Tom Sorell[4] and Luc de Witte[1,2]

[1]Research Centre Technology in Care
Zuyd University of Applied Sciences
Heerlen, the Netherlands

[2]School for Public Health and Primary Care (CAPHRI)
Maastricht University
Maastricht, the Netherlands

[3]Medicine, Ethics, Society & History (MESH), School of Health and Population Science
University of Birmingham
Birmingham, United Kingdom

[4] Social Sciences
University of Warwick
Warwick, United Kingdom

Corresponding author:
Sandra Bedaf
Sandra.bedaf@zuyd.nl
+31 (0) 88 0272120

Abstract – Sustaining independent living for elderly people in their own homes is desirable for various reasons. As older people become frail or disabled, a 'gap' appears between the abilities they still have and the abilities that are required for independent living. To a certain extent robots may close this gap by providing functionality lost through frailty or disability. A scenario was created involving a re-enablement coach robot. This scenario was discussed with older people, informal carers, and care professionals in focus groups in the Netherlands, United Kingdom and France. The results provided insights into the acceptability of robots and showed that older people were open to the idea of having a robot supporting them in their daily life. Participants were also willing to have a robot perform higher level coordinating tasks while playing the role of the re-enablement coach. However, participants wanted the robot to operate at the same level of intelligence as a human carer. This implies that more attention needs to be given to the development of the social skills and behaviour of such robots. Additionally, participants acknowledged that such a robot would create tension between respecting the autonomy of the user (i.e. robot obeys all commands given by the user) and the promotion of independence in the long term (i.e. robot is programmed to maintain the abilities the user still has). Our results indicate that people preferred to resolve this tension in favour of autonomy. This choice, however, may decrease the user's abilities in the longer term and thereby undermine users' ability to live independently.

Keywords: Assistive robotics, service robots, elderly, aging in place, acceptability

Introduction

Older people generally prefer to remain in their own homes for as long as possible, and may be reluctant to move to care institutions. At the same time, at societal level, keeping older people in their homes for as long as possible is desirable: institutionalised care is expensive, and providing good care can be labour-intensive. Promoting independence, then, may reduce calls on services provided by the welfare state.

Being able to stay in one's own home depends upon one's ability to wash, go to the toilet, prepare and consume food and drinks – in short, to meet one's own needs [1]. The practical problems older people face are person-specific due to variation in age-related loss of abilities and the diversity of their home environments and personal preferences. Self-care, mobility, and interpersonal interaction & relationships are most important for independent living of older people [1]. As older people become frail or disabled their ability to function in these domains diminishes, opening up a space where care must be provided. We will describe this as the 'care-gap', the gap between the abilities one still has to care for oneself, and the abilities that are required for independent living.

Traditionally, this gap has been bridged with human care, either informally – by friends and family – or by care professionals. Changing social structures, however, have resulted in family members being less inclined or available to provide care. These changes and the increasing shortage of care staff [2] has led to technology – and more specifically robotics – being given increasing attention. Robots, particularly service robots, have the potential to support care and independence in many ways [3]. According to the International Federation of Robotics, a personal service robot can be defined as an actuated mechanism that is programmable in two or more axes with a degree of autonomy (i.e. the ability to perform intended tasks based on current state and sensing, without human intervention), can move within its environment, is able to perform useful tasks for humans excluding industrial automation application, is used for non-commercial tasks, and is usually used by lay persons (e.g. domestic servant robot, personal mobility assist robot) [4]. A possible advantage of a service robot is that it helps people to help themselves rather than doing it *for* the user. This is comparable to the use of a white cane: a white cane for the blind does not remove obstacles, but it enables the user to overcome these obstacles.

The ACCOMPANY (Acceptable robotiCs COMPanions for AgeiNg Years) project aimed to develop the functionalities of an existing service robot, the Care-O-bot® [5], in order to support older people to continue to live independently [6]. A service robot should be able to assist older people to carry out relatively difficult daily tasks on their own. ACCOMPANY distinguishes three types of potential users for its experimental platform: 1) cognitively unimpaired older persons who need some support to remain independent in their own homes, 2) informal carers, and 3) professional caregivers.

Current developments in service robotics for older people at home are mainly focused on the technical feasibility and functional performance [7]. ACCOMPANY aimed also to develop flexible as well as appropriate robot behaviour. For example: one older person may need support to overcome temporary difficulties; in this case the support of the robot should be aimed at facilitating the rehabilitation process. Another user may need the same robot functionality because he/she is permanently unable to perform the activity him/herself. A third may sometimes need the support but on other occasions may benefit from being encouraged not to use this support so as to maintain existing functional abilities.

One of the aspects ACCOMPANY seeks to promote is re-enablement. A re-enablement coach needs to motivate and stimulate; whenever someone is still capable of performing a task themselves, a re-enablement coach should stimulate the person to do so rather than performing the task for them. When developing a service robot capable of functioning as a coach, one must bear in mind that this service robot should be able to do more than just execute functional tasks; it should for example also have the qualities to monitor, to interpret a situation and to make decisions. This introduces the issue of whether it is the service robot or the user who should make certain decisions. For example, is it acceptable for a service robot to 'decide' to refuse to execute a task given by the user, in order to get the user to exercise abilities they might otherwise lose?

In order to explore these areas of tensions a scenario was created to discuss whether the presence of a service robot in an older person's house could be used to change his/her behaviour in some way. The scenario made it

possible to ask what the limits of robot intervention should be if the intervention was to be acceptable to older people, informal carers and care professionals in the Netherlands, United Kingdom and France. This paper presents their views and thoughts concerning the potential tension between autonomy and independence, and what these might mean for future robot development.

Method

Focus group sessions with older people, informal carers, and care professionals were conducted in the Netherlands, United Kingdom and France. During these focus group sessions the following scenario was discussed:

> Marie, who is 78 years old, has lived alone since her husband died ten years ago. She has ulcers on her leg, the dressings for which are changed by a nurse once a week. It is important for the healing of these ulcers that she moves around as much as possible to encourage circulation to her legs and avoid further swelling. Her Care-O-bot® knows that she should be encouraged to move about, and suggests several times a day that she walks with it to look out of the window at either the garden or the street below. Marie is reluctant to get up from her chair because she is afraid of falling and walking is uncomfortable. She also uses the Care-O-bot® to get drinks for her from the kitchen, even though the nurse has suggested that she should go to the kitchen with the Care-O-bot® but let it carry the drinks back to her chair for her. Also the Care-O-bot® can only bring bottles of water to her and the nurse suggests that she would feel warmer if she made herself hot drinks. The Care-O-bot® reminds her to take her antibiotics and to keep her leg up on a stool when she returns to her chair after, for example, going to the toilet. She is grateful for the reminders about the antibiotics but feels irritated about the reminders to elevate her leg as she hardly ever forgets to do this but she likes to get comfortable first. She sometimes put her leg down so that her cat can sit on her lap more comfortably. Her ulcers are slow to heal but when the nurse asks if Marie is moving around more she always says that she is, even though she ignores the prompts to come to the window and doesn't go to the kitchen with the robot.

As the focus groups were hosted by four different facilitators at four different parties in three European countries (i.e. the Netherlands – Zuyd University of Applied Sciences (ZUYD), UK – University of Birmingham (UB) and University of Hertfordshire (UH), and France – Maintien en Autonomie a´Domicile des Personnes Agees (MADoPA)). A detailed topic guide was produced to ensure consistency based on a shared understanding of the purpose and goals of the scenarios.

Participants

Older persons were contacted through care organizations, except for the older participants recruited by UB using the Birmingham 1000 Elders [8]. The older people recruited from the Birmingham 1000 Elders, unlike those at others sites[1], had no previous experience of working with ACCOMPANY or exposure to the robot being developed. Older persons were selected based on four criteria: 1) aged 60+, 2) living at home, 3) no cognitive decline, and 4) receiving home care. Informal carers were contacted through care organizations and personal networks. Informal carers either 1) looked after an independent older person on at least a weekly basis, or 2) had taken care of an independently older person on a weekly basis in the last year. Professional caregivers were contacted through care organizations. Their selection was based on their work activities/profession. It was required that they worked closely at least weekly with older persons who live independently.

Procedure

The focus groups were convened in separate groups of 3-8 participants in a room with a round table formation. Interactions were conducted in native languages. After signing the consent forms the scenario was explained and discussed. As the older participants at UB had no experience with the Care-O-bot®, they were shown a short video clip of the robot under development before discussing the scenarios. After the explanation of the scenario, participants were asked for their thoughts. Follow-up questions and prompts from the topic guide were then applied. All data was audio and/or video recorded.

Data analysis

All focus group meetings were transcribed verbatim. The two sites not using English (i.e. ZUYD and MADoPA) selected a representative transcript of each of the three user types (i.e. older persons, informal carers and

[1] All other participants either participated in previous focus groups or in user tests of the ACCOMPANY project.

professional caregivers) and translated this into English. Two researchers (HD and TS) then independently coded all six of the translated transcripts and all those from UB and UH, using a combination of directed analysis and Ritchie & Spencer's Framework Analysis [9]. This permitted the data to be searched for views supporting and/or rejecting the proposed tentative framework, whilst also being open to the expression of additional values/principles by participants. The resulting coding was then discussed by the two researchers (HD and TS) until agreement was reached. These final codes were then roughly worked into general themes by one researcher (HD) and presented to all the researchers who had facilitated focus group meetings. After consensus on the codes and general themes was reached, the researchers from ZUYD (SB) and MADoPA (CR) coded the remaining transcripts. Quotations were selected to illustrate the general themes and translated into English. Additional reports were produced summarising the data and providing information about the focus group meetings at each site. All of the data was then combined into a single report by HD and circulated to all facilitators for comment. Finally, one researcher (SB) analysed the final report looking for areas of tensions a re-enablement coach robot could cause and to what extent such a robot could be used to change the behaviour of older people. The results of this analysis were discussed with a second researcher (HD), which resulted in 7 topics.

Results

In total twenty-one focus group sessions were conducted in the Netherlands (6), UK – UB (3), UK – UH (3) and France (9). A total of 122 persons participated in these meetings (see Table 1). Older participants were >62 years of age[2]. The mean age of the older participants of ZUYD and MADoPA was 78.5 years (42 to 95). The age of the participants of UH and UB was unknown, except that they were aged 65+. Informal carers took care of (one of) their parents, their spouse, neighbour, or their aunt. In one case the older person had recently passed away and in two cases the older person taken care of was recently institutionalized. The profession of the care professionals varied from care worker, nurses, psychologists to managers of elderly care facilities.

Table 1: Overview of number of participants divided per research site.

	The Netherlands	United Kingdom – UH	United Kingdom – UB	France	Total
Older persons	10	5	21	19	55 (19 male, 36 female)
Informal carers	11	4	-	15	30 (6 male, 24 female)
Professionals caregivers	13	6	-	18	37 (1 male, 36 female)
Total	34	15	21	52	122

Different topics and areas of tension were discussed during the focus group sessions (see Figure 1 – 3).

[2] With the exception of one Dutch participant who was 42 years old, but due to her illness faced similar problems to those of older people.

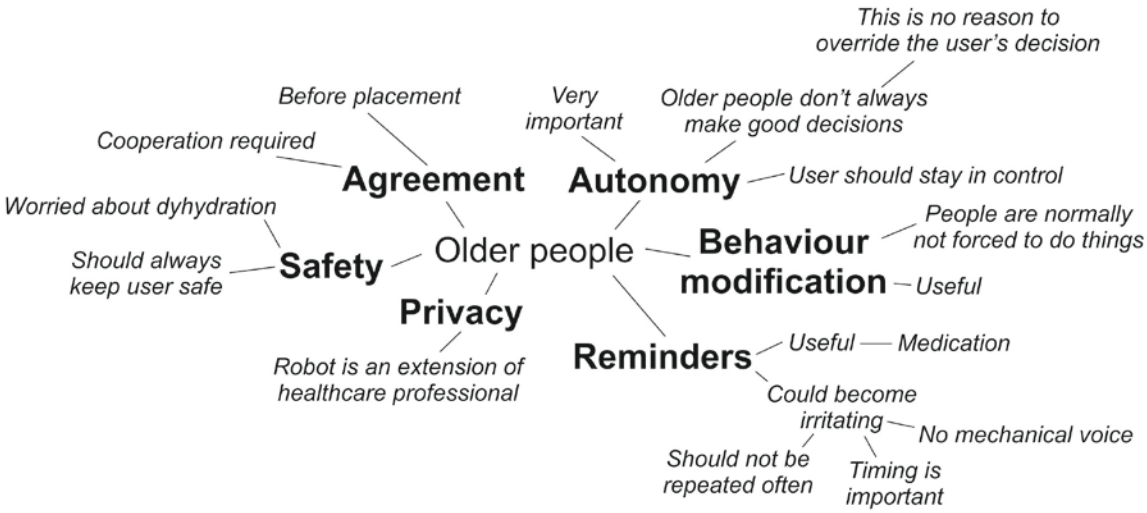

Figure 1: Overview of the different topics (in bold) that were discussed during the older participants' focus group sessions.

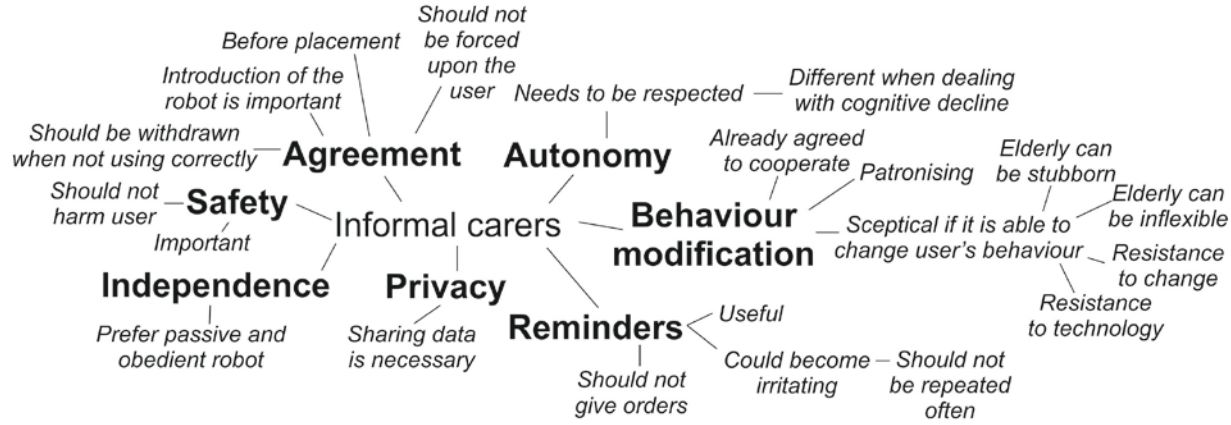

Figure 2: Overview of the different topics (in bold) that were discussed during the informal carers' focus group sessions.

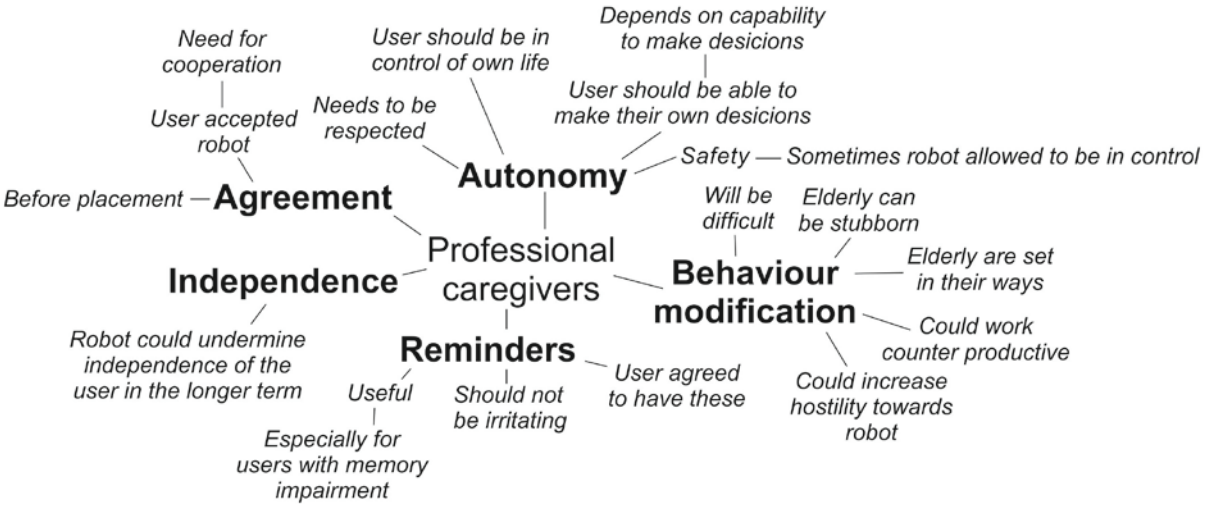

Figure 3: Overview of the different topics (in bold) that were discussed during the professional caregivers' focus group sessions.

A total of seven different areas of tension were discussed: 1) Autonomy, 2) Agreement, 3) Reminders, 4) Behaviour modification, 5) Independence, 6) Safety and 7) Privacy. No structured questionnaire was used, which resulted in not all topics being discussed in every session (see Table 2). For example: the topic

"independence" was not mentioned during any session of the older participants groups, but it was mentioned during the sessions of the informal carers as well as the professional caregivers.

Table 2: Topics emerged from the focus groups session per group type.

	Older persons	Informal carers	Professional caregivers
Autonomy	X	X	X
Agreement	X	X	X
Reminders	X	X	X
Behaviour modification	X	X	X
Independence		X	X
Safety	X	X	
Privacy	X	X	

Autonomy

Older people were able to relate to the scenario of Marie. This group acknowledged that (older) people do not always make good decisions (defined as those that best promote their own health or other kinds of well-being). Nevertheless, the majority of these older participants stated that the user should always stay in control of their own life and several participants were very explicit that making a decision about which others would disapprove was not a sufficient reason to let the robot override the user's decision. Autonomy of the user was seen as most important and the user's view about how the robot should behave must always be respected.

"I'm also such a person, so I can tell you that I don't always do what they tell me to do." (ZUYD OPFG2 E3)

"Older people still have their personal freedom and if they say 'no' it should be 'no', shouldn't it?" (MADoPA OPFG1 P1)

"I dislike it and I think it's a bit (stronger) than dislike, that the idea that because you've reached a certain age…you have to have something, or you're put in a position where someone's telling you what to do all the time… You have a right to decide I don't want, I don't care what I'm being told to do. I have a right…as any adult does not to do it. And not to put up with being nagged at." (UB OPFG1 P5)

Informal carers were also able to relate to the scenario, and provided similar examples from their own experience. They likewise thought that the autonomy of older people in general needs to be respected, except when dealing with older people who are cognitively impaired. Allowing this group to make their own decisions was seen as less important.

The professional caregiver's group shared the same opinion as the older people's and informal carer's groups, as they agreed older people need to be in control of their own lives. This group also stated that the autonomy of the user needs to be respected and older people should be able to make their own decisions.

"It always comes back to the fact that what the professional care worker needs or wants is not necessarily what the user needs or wants. Our priority is the user's need or want and we have to take it into account. We aren't going to do anything without the user; if he or she doesn't want to do something, we can't force them to do so against their wishes." (MADoPA PC1 P6)

"I suppose what you want with people is for them to take control as much as possible themselves." (UH PC B)

Some professional caregivers, however, disagreed that older persons always should to be in charge of the robot as they could envisage circumstances, usually associated with safety, when they would want the robot to be programmed to act in ways that are not in line with the wishes of the user (and which would therefore undermine the autonomy of the householder). Professional caregivers made a similar distinction between older people who are still capable to make their own decisions and those who are not.

"We deal with people who are mentally fit and able, unless their health has deteriorated and they have cognitive problems, but for as long as a person is in full possession of their mental faculties, they are free to do whatever they want at home." (MADoPA PC1 P7)

A: *"And some people like decisions to be laid for them whereas stronger people prefer to make their decisions themselves."*
F: *"Rights of choices versus health and safety."*
B: *"And the capacity. The capacity of the individual isn't it? The capability and capacity, you know."* (UH PC)

Agreement

Participants in the older person groups tended to think that the robot would not have been placed in the home of the user against his/her wishes and that some agreement about the tasks the robot would perform had been reached prior to its placement. Cooperation with the robot was therefore seen as a reasonable requirement deriving from the initial agreement to accept the robot. Thus, respect for autonomy of the user starts even before the robot is installed in the user's home. Some of these participants referred to this assumed prior agreement when discussing whether it was acceptable for the robot to be programmed not to comply with all the commands and preferences of the user.

"To begin with, if someone wants a robot in their home, if they decide to get one, then what's the point if afterwards they actually don't listen to it? … To my way of thinking, with the robot it's as when you go to see a doctor. If you don't take the mediation he prescribed for you, why bother going in the first place?" (MADoPA OPFG1 P7)

"You have chosen yourself to have that thing in your house, so you also have to accept the things it does." (ZUYD OPFG1 E2)

"What is the point of people having a robot, who are going to provide facilities, you are going to accept it or not? And if you're going to ignore anything and everything it does, except get you your drink of water you might as well save the money and get her one!" (UB OPFG1 P1)

The informal carers also expected that the placement of the robot would have been discussed and agreed in advanced with the user and that older people should not be forced to have a robot. Some informal carers added to this that if the user would not follow its instructions and would not make good use of it (which in part meant cooperating with it in ways that would be beneficial to them) the robot could be withdrawn and placed with someone else. Further, the informal carer group participants mentioned the importance of how the robot would be introduced into someone's home. Each group had ideas how this should be done.

"But when you take the benefits, see the advantages of this right away and it is introduced stressing the benefits then I think it is possible." (ZUYD IF2 M1)

"I think you should take something as an starting point. And with that you should also have a certain policy in which you state: If this is your care need and this is your situation we can help you, but you should also be motivated. I think you need to evaluate the situation after a certain period. You should take a look at what it brought to the user, but this doesn't need to be in the controlling way, because you're still dealing with humans." (ZUYD IF1 M1)

"They're signing away their privacy for certain things. […] That they actually sign that they agree to having this robot instead of going into a care home because the function of this robot is not just to be useful but also for health and safety." (UH IF P4)

Some professional caregiver participants agreed with the informal carers and suggested that if the user agreed to accept the robot, it was reasonable to expect the user to co-operate with and use it.

"You of course need to judge certain things in an objective way, and when you say at every occasion oh well, people should do it themselves hoping people will be honest in their reporting, then I say there is no point in bringing in the robot. You must of course have certain registrations, information. You need to be able to access that otherwise there is no point in all this." (ZUYD PC1 P4)

Reminders

In the scenario the robot reminds Marie to take her medication, to keep her leg elevated and to move around to increase her circulation. Overall, the older people group participants thought these reminders were useful. They were aware that memories might begin to fail as people become older. Reminding people to take their medication was therefore regarded as useful. However, these participants also had some concerns regarding the reminders: they were afraid these reminders could become irritating if repeated often, if the reminders were issued by a mechanical voice and/or by the timing of the reminders (e.g. being interrupted when doing something the user particularly enjoyed).

"Yes, but if it is programmed to push you every 30 minutes and you're watching a thrilling movie. You don't want to get up and then it stands next to your chair: You have to get up, you have to walk." (ZUYD OPFG1 E3)

"Perhaps there's the way it's said too. Perhaps the robot should say it gently and kindly rather than as an order." (MADoPA OPFG1 P3)

In the informal carers' groups similar contrary views were expressed about the reminder provision: some thought it would be useful, but other participants also thought that they could become annoying.

"And look at my mother, every day she asks what day it is. The robot can remind her. Reminders are automatic things, it could do that without any difficulty." (MADoPA IF3 P3)

"If it senses that she has taken the legs down for a given period of time. Say 40 minutes has elapsed and the robot has sensed that she hasn't put it back up again it could give her a gentle reminder, not something every 5 minutes like when you are in the care and you haven't put the seatbelt on." (UH IF P3)

R1: *"So the role of the robot should be more passive? Something that gives reminder but no orders. An inferior."*
M several: *"Yes."*
M2: *"For instance a signal for activities and nothing like: You should go to the toilet now, or anything like that."*
R1: *"And what about user that need to do exercises for physical therapy. Also only a reminder for that and nothing more?"*
M2: *"Nothing more."* (ZUYD IF1)

The professional caregivers also thought the reminder function of the robot was useful, especially for clients with memory impairments. And again there were some professional caregiver participants who mentioned that reminders issued by the robot should not become irritating. Professional caregivers often associated the reminders with what people wanted and thought being reminded of something/to do something was something people should agree to.

"If you're the type that watches television in the evening that will become a pattern for the robot. So than you should be able to receive the signal half an hour or an hour before." (ZUYD PC2 P4)

"Reminders and helpful reminders and actually wanting to be signed up to this." (UH PC B)

Behaviour modification

The robot prompting health-promoting behaviour (e.g. telling Marie to move around to increase her circulation) evoked mixed responses from the older participants. Some thought it would be useful, while others felt sympathy for the discomfort that physical therapies can cause. Another factor influencing the participants' views was that people are not normally forced or cajoled into cooperating with health-promoting behaviours. People are, for instance, free to smoke tobacco and drink too much alcohol. No clear boundary emerged in

these discussions between adherence to 'prescribed' actions (recommendations of the 'do this in order to recover more quickly' kind) and adherence to health-promotions messages (advice of the 'do this to avoid damaging your future health' kind).

"I think the robot could sort of be more forthright if you say. Sort of tell to do it more often. Because I know sitting in a chair as I have been for 4 months that you need a lot of persuasion to get up from that chair to do something… It's very difficult, you really got to have somebody to prompt you to make you get up and do something. If you are comfortable in the chair and you know it is gonna hurt when you get up." (UH OPFG P2)

"The robot doesn't know whether she's having a good day, bad day, if she's had other problems, is the leg feeling more painful today, or has she got an upset stomach or a hangover." (UB OPFG2 P1)

The views of the informal carers concerning prompting health-promoting behaviour were also mixed. These groups assumed the user already agreed to cooperate with the robot, at least in health-related interventions. It was also mentioned several times that trying to make people change was patronising. Additionally, informal carers reported that, in their experience, older people could be quite stubborn and inflexible in their views and attitudes. Informal carers were therefore sceptical that the robot would be able to change older people's behaviour. Some even thought that it was not worth trying to change the minds of some older people, so great was their resistance to change. Some participants in the informal carers groups also thought that older people in general might be resistant to technology. There was less evidence of this reluctance in the views expressed by the participants from the older people's group.

"I think these older people, they will not go with the robot, really! From the experience with my father… He would not say something like: Ok, I will walk. More like: Switch that device off." (ZUYD IF2 M3)

"No, he really is very set in his ways. He can't see things from a broader perspective, not anymore, and there are things that he cannot accept anymore. He has become very backward-looking recently, since the illness set in and he lives in his past." (MADoPA IF1 P5)

"If someone doesn't want to take their doctor's orders on board, they're not going to take much notice of a robot either." (MADoPA IF1 P6)

Some care professional participants shared the view that older people can be very stubborn or set in their ways. It could therefore be really difficult to get them to change their minds and to change their behaviour for their own benefit.

"But you know what it's like with people as well, when they are in their armchairs and you say to them: Come on, let's go and do this, and they say: Oh no, I don't want to." (MADoPA PC1 P5)

P5: *"Yes but they are non-compliant eh…"*
P4: *"They do what they themselves seem right."* (ZUYD PC1)

"They don't like changes well, older people are resistant to change." (UH PC PD)

Professional caregivers also believed that forcing older people to change their behaviour could be counter-productive. Forcing older people to change their behaviour could also lead to resentment according to these participants, which would also increase hostility to the robot.

"She is very interested in something and then it gets turned off in the middle of something that she is very interested in, that would really annoy her." (UH PC PD)

P6: *"But rather like: We agreed to watch television till 6 o'clock and then we will walk for 5 minutes, but not like: Bang, 6 o'clock television is switched off."*
P4: *"I think this would have an adverse effect, that the resentment against exercise would only grow."* (ZUYD PC1)

Independence

Some informal carer participants preferred a passive and obedient robot. Some care professionals noted that having a robot that does things for the user might undermine the independence of the user in the longer term. They had experience of clients developing a *"why should I?"* attitude to doing things for themselves, because the carers themselves were at hand to do it for them. And these participants thought this attitude could be transferred to the robot.

> *"Why make the effort if there's someone here to do it for me? It's an attitude we're all familiar with and expect to see on a fairly regular bases. It's part of our job as well, as is often said, not to do things instead of people but to help them when they can't manage. But people, especially when it comes to services where they have to pay contribution, tend to say if I've paid, they should do it for me."* (MADoPA PC1 P7)
>
> P4: *"What I tend to hear is: I pay to have someone do things for me. My response is: Yes you pay, but you pay to have someone help you do things, which people don't like hearing because for them it's a case of: I pay therefore you do it instead of me."*
> P5: *"That's even the way it is for us and we're not even a service that's paid for, I mean the person doesn't pay us directly, which is the same thing."* (MADoPA PC1)

Safety

Some of the older people group participants of UB were worried about dehydration if the robot refused to get drinks. The robot should keep the user safe.

> *"I think that if the robot wasn't giving her the water and she was left to herself she'd just not have the water, she would dehydrate probably and that would be another problem."* (UoB OPFG3 P7)

Most participants in the informal carers group regarded the safety of the user as important. They were therefore more resistant to the robot behaving in ways that could put the user at any risk of harm (e.g. refusing to fetch Marie drinks that she could fetch for herself).

> *"The problem with letting others decide for the person is the loss of that individual's personal freedom, and the fact that different parties have different interests and motivations: the family wants to be reassured, and care workers want to care and keep the patient safe even though the patient may not necessarily want to be kept safe."* (MADoPA IF1 P7)
>
> R: *"Should the robot be programmed to refuse to get these drinks for Marie unless she goes to the kitchen with the robot?"*
> P3: *"No, she might be incapacitated."*
> P4: *"It might be a bit dangerous to do."* (UH IF)

Privacy

Older participants were open to the possibilities that the robot could be an extension of the healthcare professional in the home.

> R1: *"And concerning the data the home carer could get from the robot. […] Isn't it personal?*
> E7: *"No. Home carers do the same."* (ZUYD OPFG1)

The robot's sharing data was regarded as necessary by the informal carers when professional caregivers or other paid carers are involved. They thought this was necessary to ensure effective care. The robot may have been regarded as an extension of the care team and therefore to be governed by the usual norms for sharing information between members of such teams.

"If you say that the robot is going to replace a home-help, if the home help learns that the lady never raises her foot, she will take that back to the nurses or the doctor saying that there's a problem. If something is medically prescribed, which she hasn't complied with, that has to be reported – perhaps confidentially – to the doctor. But that has to be reported, otherwise it's not much use." (MADoPA IF3 P1)

"Yes, that the robot does something. That it notes things down, just like we do. For instance the number of times she got out of her chair." (ZUYD IF1 M6)

Discussion

This study enabled us to explore the areas of tension that a re-enablement coach robot can cause, and to discuss with different potential user groups the limits that should be set on the extent to which a robot in an older person's house could be used to change their behaviour. Focus groups session were conducted in three different countries (i.e. the Netherlands, UK, and France). No major differences could be found among the views of the participants of the three countries.

Participants' previous experience with technology plays a role in the acceptance of robotics [10]. This could imply that the informal carers and professional caregivers would have a more positive attitude towards the acceptance of robot as they are likely to have more experience with technology. Some of the informal carers also mentioned that they thought older people in general might be resistant to technology, however the results did not reflect this. A robot providing reminders was generally regarded as useful and acceptable by all target groups. This is in line with the study of Smarr et al. [11] in which being reminded by a robot to take medication was a preferred activity by older adults. However the tasks a robot needs to carry out in order to be useful are often more difficult than first appears [12].Participants in our study expected that a robot providing reminders was also capable of responding to the user's habitual behaviour and to provide useful reminders depending on the situation. For example, if the user watches the 8 o'clock news every evening, the robot should learn not to interrupt this activity with a reminder to do a different activity. Without this level of intelligence the robot could easily become annoying. Prompting health-promoting behaviour was not as acceptable as providing reminders. Our results from the informal carers and professional caregivers also suggest that changing health-related behaviour of older people may be challenging, as they can be quite stubborn and set in their ways. These participants tended to consider that a robot forcing older people to change their behaviour could be counter-productive and could lead to resentment, which would increase hostility/rejection to the robot. Thus in order to be accepted by this user-group, the robot must in some real sense be within their control. This was also acknowledged in all focus groups. Sharkey & Sharkey [13] also state that a robot that is under the control of an elderly person could empower them and increase their independence. For our participants older people have the right to be in control of their own lives and therefore the robot should respect their wishes. This raises the question of how much control an elderly person should be allowed [13]. Some older participants were very clear that the robot should always obey the householder and should never been allowed to refuse tasks given by the user. Nevertheless, such a robot may actually erode the quality of life of older people, because when the robot does too much it can de-skill, de-motivate and/or otherwise erode the abilities the user actually still has, risking decreasing the user's ability in the longer term. In this event the robot would become a 'wedge' that widens the care gap. This tension between "respecting the autonomy of the user" and "the promotion of the independence of the user on the longer term" was discussed in every focus group.

Participants were also not always consistent in their responses. Even though participants in the older person groups thought the user should always be in control of the robot, they also stated that when a robot is installed with permission of the householder and agreements are made about certain aspects, the user should honour these agreements even when the robot appears to nag. Care professional participants were also not consistent concerning who should be in control of the robot, as they could also envisage circumstances where the robot would refuse to execute a given task, often related to safety. However, restraining a person to avoid harm could be a slippery slope towards authoritarian robotics [13]. Additionally, participants also envisioned situation in which the robot in trying to promote good behaviour could harm the user: by refusing to fetch Marie a drinks to encourage her to get her own, the robot may cause Marie to eventually become dehydrated. Care professionals agreed that a robot should never behave in such a way that it could harm the user. In the situation described here, the robot would eventually have to give in and fetch the drink for Marie. The right

balance needs to be found between promoting good behaviour and protecting the user from dangerous situations. In the same situation there is also tension between "respect for autonomy" and "promotion of independence": for the promotion of independence it is best if Marie gets the drink herself, but a robot refusing to execute the command to get her a drink does not respect the autonomy of the user.

Overall, it can be said that the participants had high expectations and demands concerning the capabilities and intelligence of an acceptable robot. The robot was expected to recognize the circumstances, interpret these and make decisions depending on the situation. These qualities are similar to those of a human carer. This comparison to a human carers, who in their turn are expected to behave in certain ways, resonates with the outcomes of a study concerning the client's perspective on current client-centred care in the Netherlands [14]. According to this study recognition of the client's values by the caregivers is the central element in tailored care. This means that the client must be seen as a unique, comprehensive, autonomous human being, and the life of the client and fairness needs to be central in care, and that the client needs to be treated as an equal, interdependent partner in care [14]. This underlines the importance of personalizing the robot, making it sensitive to the emotions and difficulties of the user; enabling the robot to be flexible in the timing and extent of care; and designing the robot to respect the decisions of the user.

Designing a robot that is sufficiently flexible to bridge the gap between one's abilities and the abilities required for independent living will be difficult to achieve as this not only involves technical challenges, but also ethical ones. Further research is needed to address the issues and tensions mentioned above and to take the next step towards the development of acceptable robots for supporting independent living of older people. In this study only the acceptability of the robot as a re-enablement coach was explored. For future research it is important to study the influences of other behaviour types on the acceptance of robots by the target user group.

Limitations

This study reflects the limitations of qualitative research in general. Some of the focus groups contained a dominant speaker, who drowned out the potentially interesting and relevant views of other participants. Sampling involves elements of both convenience and self-selection, which means that there is a possibility that the data is influenced because a certain group or type of people was attracted to participate in the study. The inclusion criteria were also not particularly specific (e.g. older people only had to meet three criteria and informal caregivers only one) and there were no inclusion criteria concerning the gender balance of the sample. This resulted in an unbalanced sample size between genders, as 79% of all the participants were female. When looking at the balance between male – female for all three user groups it can be found that 65% of the older people, 80% of the informal carers, and 97% professional caregivers of the were female. Overall, females have a higher life expectancy, and according to Eurostat 62% of the European population aged 75+ was female [15]. The overrepresentation of females among the professional caregivers and informal carers may be explained by the fact that care professions/tasks these days are still mainly executed by females. Although the inclusion criteria resulted in an overrepresentation of females, a broad group of 122 participants was included and we think these participants can be seen as representative for the general population. One Dutch participant in the older user focus group was significantly younger than other participants at age 42. She was deemed to face similar problems to older people receiving home care and therefore included. The older participants who participated in the focus group sessions facilitated by UB had no previous experience of working with ACCOMPANY or previous exposure to the robot, while other participants did. This may have affected their views. Nevertheless, no major differences between these older participants and the older participants from UH, ZUYD and MADoPA could be found. There was also some overlap between the types of groups: many of the people in the older people groups were themselves caring for (or had previous experience – both informal as professional or giving care to) older people. The informal carers spoke also about the care that they would themselves hope to receive and some of the professional caregivers referred to experiences they had when providing care to their own family members. It is not clear this limited the variety of views expressed.

Additionally, this study was conducted by various researchers in three different countries (i.e. the Netherlands, France, and UK). The team met regularly to discuss progress and to attempt to standardise the conduct of the research. In spite of this, the data may be influenced by the fact that the focus groups in the three countries

were all moderated by different facilitators. Similarly, the research was coded by more than one member of the research team, so the analysis was subject to the same potential variation, even though attempts were made to standardise the coding and to get agreement on the themes. The focus groups were also conducted in the local languages (i.e. Dutch, French, and English). The non-English data was, after transcription, translated into English. In this process the meaning of some of the quotations may have been subtly altered or distorted. Given the international character and the sample size of this study, the disadvantages of using three different sites was found to be of minor importance compared to the advantages.

Conclusion

In this paper we explored the areas of tension and the boundaries of a re-enablement robot coach for older people through focus group meetings. What became apparent is that potential users are open to the idea of having a robot to support them in their daily life. Moreover the concept of a robot performing higher level coordinating tasks within the role of a re-enablement coach was acceptable.

Participants recognized that a re-enablement robot coach introduces a tension between two different values: 'respect for autonomy' and 'promotion of independence'. For example, a robot that respects the autonomy of the user will obey all commands given, even the ones that may harm the independence of the user in the longer term (i.e. when the robot does too much it can de-skill, de-motivate and/or otherwise erode the abilities the user actually still has, risking decreasing the user's ability in the longer term). In this event the robot would become a 'wedge' that widens the care gap. On the other hand, a robot that refuses to execute a task given by the user, in order to promote independence of the user, seems not to respect the autonomy of the user.

Older people at their most rational probably know that it would be best to do as much as possible for themselves. However, older people, informal carers and care professionals also acknowledged that older persons do not always do what is best for them. And our data suggests that potential users may prefer to resolve the tension between 'respect for autonomy' and 'promotion of independence' in favour of autonomy, making it unacceptable for robots to be programmed to resist commands. However, this dilemma is rather an ethical dilemma as such robots do not permit the user to choose inappropriately help from the robot. This can drive the user's ability and need further apart and can even create dependence or can encourage passiveness which undermines the ultimate independence of the user as the robot may no longer be able to fill the care-gap that emerges.

It is also important for the acceptance of a re-enablement robot that such a robot be more than just a helper. Since the gap between the abilities one still has and the abilities that are required for independent living is likely to differ between people, and over time for the same person, a robot needs to be flexible in order to be effective and efficient; one size does not fit all. A re-enablement coach robot therefore will need to be extremely smart and must be able to perform tasks with the similar qualities and intelligence of human caregivers in order to be found acceptable. To function at such a high level of intelligence robots are required to become more advanced than current available robotics permits. Developing the functional features to perform activities is not the only challenge in robot development; even more challenging will be the development of social behaviour and skills that will enable a re-enablement robot to win acceptance from users.

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Vitae/biography

Sandra Bedaf MSc. is a junior researcher and teacher at Zuyd University of Applied Sciences and a PhD candidate at School for Public Health and Primary Care (CAPHRI) of Maastricht University. She has an industrial design background (Technical University of Delft) with the focus on user-centered design, usability and designing for the medical field. She finalizes her PhD early 2016, which is about the development of a robot that will enable elderly to prolong their independent living. At Zuyd she has been involved in the ACCOMPANY (FP7) project in which she has focused on user-related aspects of the robot system developed in this project.

Prof. Heather Draper is Professor of Biomedical Ethics at the University of Birmingham. She is committed to interdisciplinary and multi-disciplinary research. Her background is one of philosophical bioethics but she is also engaged in a number of projects employing empirical bioethics. She researches with a range of practitioners and researchers from other disciplines including clinicians and surgeons, biomedical scientists,

social scientists, human rights lawyers, roboticists, and the UK medical military. She has an international reputation in the field of transplantation and donation ethics, and is widely published in this area. She is a member of the UK Donation Ethics Committee, NHS Blood and Transplant Deceased Donor Family Tissue Advisory Group and the Donation Committee, University Hospital Birmingham NHS Foundation Trust.

Dr. Gert-Jan Gelderblom unfortunately passed away in December 2014. He has been working at Zuyd University of Applied Sciences since 1997. He functioned as a senior researcher and project manager. His work has focused on the development and user driven evaluation of assistive technology. His work concerned a wide range of technologies but in recent years more and more the focus was on the application of robotics in care. He has been involved in many projects as project manager among which were the European projects Movement (FP6), Robotics for Healthcare and IROMEC (FP7).

Prof. Tom Sorell Tom Sorell is Professor of Politics and Philosophy and Head of the Interdisciplinary Ethics Research Group in PAIS. He is an RCUK Global Uncertainties Leadership Fellow (2013-2016). Previously, he was John Ferguson Professor of Global Ethics and Director of the Centre for the Study of Global Ethics, University of Birmingham. In 1996-7 he was Fellow in Ethics at Harvard. He was Co-ordinator of the FP7 DETECTER project and is leader of two Work Packages in the FP7 SURVEILLE project. He directs the major AHRC project, FinCris, and is a participant in the FP7 ICT ACCOMPANY project on care robotics. Formerly, he was Co-Director of the Human Rights Centre, University of Essex. He has published extensively in moral and political philosophy, including four books, and many journal articles. His current research is in the moral and political issues raised by emergencies, including terrorist emergencies. He has led a project on ethics and border guarding for FRONTEX, and advises the FP7 security projects INDECT,FOCUS, MOSES, and FASTPASS. He is advisor to the FP7 ICT project FROG and has also worked as a consultant on security-sensitive material in UK universities. He has also worked on the committee advising the AHRC on the Internet of Things.

Prof. dr. Luc de Witte is Professor of Technology in Care at Zuyd University of Applied Sciences and Maastricht University. He is director of the research centre Technology in Care and of the national centre of expertise on innovative care and technology EIZT. He has supervised more than 20 PhD studies and a large number of national and international projects in the field of care innovation in long term care. The past 8 years he focuses on technology in care. He also runs a research program on Health in Slums in India.