

*Designing a Social Robot to Support Older Adult Homecare:
Qualitative Study of Testing Results*

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Abstract

Social robots may be a solution to the growing number of elderly and thus the demand in homecare. Previous work shows good acceptability for robotic tools in homecare. The Guardian project associates a social robot, used by the senior, with an application to be used by caregivers. The objective of this testing phase was to assess whether the Guardian system would be helpful and well accepted within the real conditions of a homecare environment. The Guardian system was tested in a real-life homecare environment during an early testing phase. Data was gathered through questionnaires and comments formulated by the participants. 30 participants were recruited across Italy, the Netherlands and Switzerland: 10 older adults, 10 formal caregivers, and 10 informal caregivers. The collected data was then analyzed through thematic and qualitative method. The results of this test show that users were ready to accept robotic solutions into a homecare environment. Most users found the Guardian system easy to use, but it appears older adults' expectations were not met regarding helpfulness in everyday tasks. Caregivers saw some benefit in using it to facilitate cooperation between caregivers but found human-robot interaction and application functionalities limited. The most common comment was that users want vocal commands for an easier and more natural interaction with the robot. Social robotics may very well be a relevant field to explore regarding homecare but users' expectations are growing fast. In this regard, accessibility is key and must remain a primary focus when considering tool development for elderly.

Keywords: Older Adults, Elder Care, Early Testing, Daily Coaching Solution, Evaluation in Natural Environment, Social Robot

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Introduction

Background

According to the United Nations World Population Prospect, “by 2050, one in four persons living in Europe and Northern America could be aged 65 or over” (Department of Economic and Social Affairs & Population Division, 2022). In fact, between 2015 and 2050, “the proportion of the world's population over 60 years will nearly double from 12% to 22%” (WHO, 2022). Mainly due to increased life expectancy (Department of Data and Analytics, 2020; Eslami, 2016) and declining fertility in both developing and developed countries (Beltrán-Sánchez et al., 2015; Eslami, 2016; Nargund, 2009), the world population is definitely aging (Beltrán-Sánchez et al., 2015; Department of Economic and Social Affairs & Population Division, 2022; Keyfitz & Flieger, 1991; Spasova et al., 2018).

With the increasing proportion of older adults in most countries (Department of Economic and Social Affairs & Population Division, 2022; WHO, 2022), a proportional increase in the need for long-term care is observed as well (Spasova et al., 2018). Long-term care can be defined as “medical and non-medical care provided to people who are unable to perform basic activities of daily living” (*Long-Term Care - Glossary*, n.d.). In the United States for example, the Administration for Community Living estimates that people aged 65 in 2020 had a 69% chance of requiring long-term care (1 year or more) during their remaining years (ACL Administration for Community Living, 2020).

For the majority older adults, in the event of a long-term care requirement, a clear preference toward home care over senior communities or nursing homes was observed in an American study (Malato, 2016). Moreover, presently in all regions in Europe, the availability of residential care (e.g., nursing homes) is insufficient and demand exceeds supply in many countries (Spasova et al., 2018). This situation calls for innovative solutions in terms of long-term care and especially home care.

One of many possible solutions to the elder care crisis our society is facing (Abel, 2022; Drummonds, 2007; Greene et al., 2005; Haubner, 2020; Lancet, 2014) may very well be found in the development and use of digital tools such as apps and home automation tools. As automation appears to be underutilized among older adults (Pal et al., 2018), it could facilitate everyday activities, thus alleviating some aspects of the home care process.

Prior Work

Various studies were conducted on the subject of automation and more precisely the use and acceptance of robotic tools with older adults (Cesta et al., 2016; Fasola & Matarić, 2013; Fischinger et al., 2016; Koceski & Koceska, 2016; Pino et al., 2015; Wu et al., 2016). One study in particular provides promising results toward the acceptability by seniors of robotic tools within home care systems (Cavallo et al., 2018). As for professional caregivers, experimental results seem to be less positive toward the implementation of robots, mainly due to the idea that current robots may not be able to recognize and integrate individual perspectives of care (Busse et al., 2021).

Different versions of social robots for the elderly were designed and tested during the last two decades. However, it seems that none of these prototypes managed to make it to the commercial phase. This might be due mostly to three distinct reasons according to an article

from the International Journal of Social Robotics (Bardaro et al., 2022): “the intrinsic complexity of the tasks the robot has to achieve (Alterovitz et al., 2016), the unpredictability of a domestic environment (Bodenhagen et al., 2019), and the unstructured interaction with the users (Coronado et al., 2017)”. The search for the perfect social robot continues, in part with the Guardian Project.

The Guardian System

The Guardian system is composed of three elements: a social robot, which is installed in the older adult’s living room, and two mobile applications for the older adult and their caregivers respectively. The caregiver application gives the ability to plan different types of reminders (medication, meals, and activities), self-reports requests (sleep quality, global wellbeing); It can also be used to set appointments and offer personalized messages. Once the older adult reports or answers to a reminder, the caregiver can see the results on their application.

As for the older adults, they receive vocal notifications from the robot and can then interact with it using their application. With the application, seniors can self-report on their sleep or well-being, confirm or infirm reminders with additional information. They can also consult planned appointments.

Goal of This Project

The Guardian Project aims to explore and develop possibilities in the field of robotic-assisted home care by designing a social robot that is helpful to both the older adults and their caregivers, namely health professionals or close relatives. Using a Misty II robot (*Misty Robotics*, n.d.), paired with a mobile application linking the senior with their caregivers, the Guardian system offers various digital tools to alleviate the homecare process. Through the mobile app, caregivers can manage meal and medication reminders, ask for wellbeing and sleep quality reports, suggest personalized activities, add appointments to the senior’s calendar, and have an overview of the senior’s answers (Lewis, 1995).

Early Testing

After promising usability tests conducted in a controlled environment (Villaverde Naveira et al., 2022), the early testing phase was designed to evaluate the Guardian’s system operation in real-life conditions and allow for a more comprehensive user-centered approach.

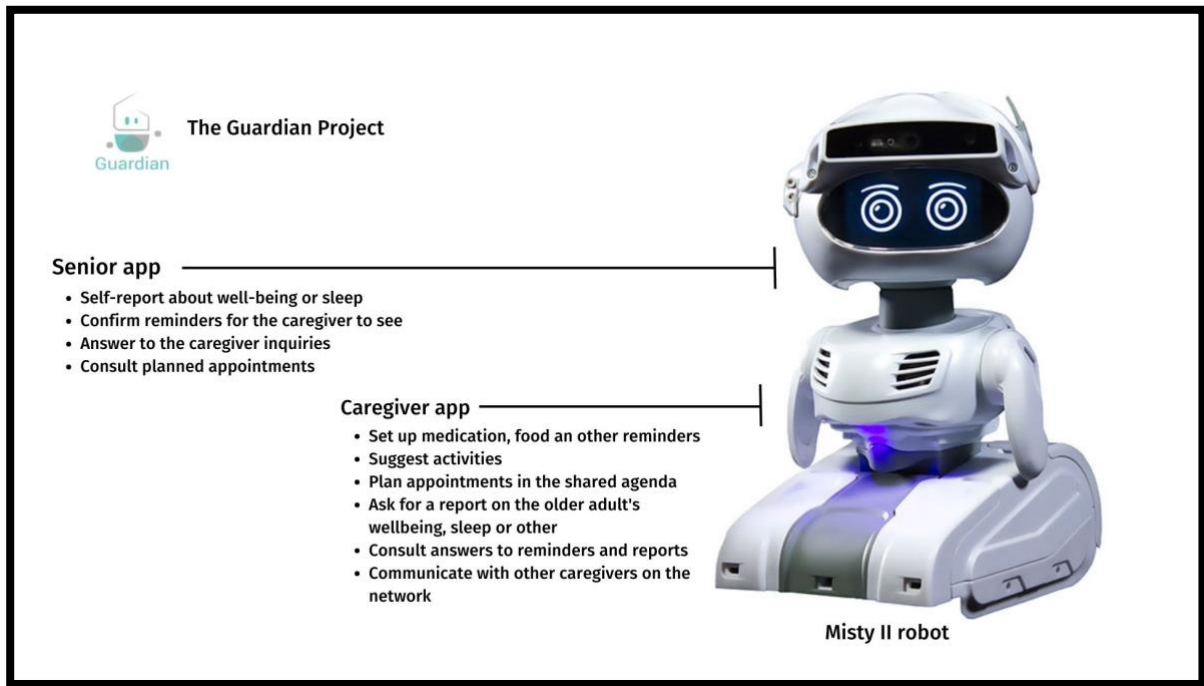


Figure 1: Functionalities of the Guardian System

Methods

The early testing stage of the evaluation process was mainly focused on the usability of the Guardian system in real life conditions. The aim of this evaluation was to observe how the robot would fit into the everyday life of an older adult receiving homecare, and how much help it could provide to the caregivers. To this end, questionnaires were given and filled out by the participants at the end of the testing period.

Recruitment

Groups of three participants were enrolled for this trial: an older adult, a professional caregiver, and an informal caregiver. The adults were chosen to be older than 65, and recognized as *frail* according to the Frailty Index (Rockwood et al., 2005) or to a SF-12 survey (Ware et al., 1996). The formal caregivers were health professionals involved in the care of the recruited senior and must have had at least a year of experience in the field. As for the informal caregivers, they had to be relatives or close friends of the senior, providing frequent care and aged 18 or older. All groups needed to display good written and oral comprehension of the local language and be available during a two weeks period. Furthermore, an open mindset towards technology was asked of the caregivers.

The recruitment process took place in Switzerland, Italy, and the Netherlands; it aimed to include 15 participants from each country. Even though the desired number of 45 participants was not reached – partly due to logistic problems during the recruitment phase – 35 participants interested in testing the robot in a home environment were enrolled. 30 participants in total fully completed the test: 10 seniors, 10 formal caregivers, and 10 informal caregivers. Of those who participated in the two weeks long testing phase, only certain participants were able to fill out the required questionnaires. The number of collected questionnaires is presented on each corresponding table in the Results section.

Procedure

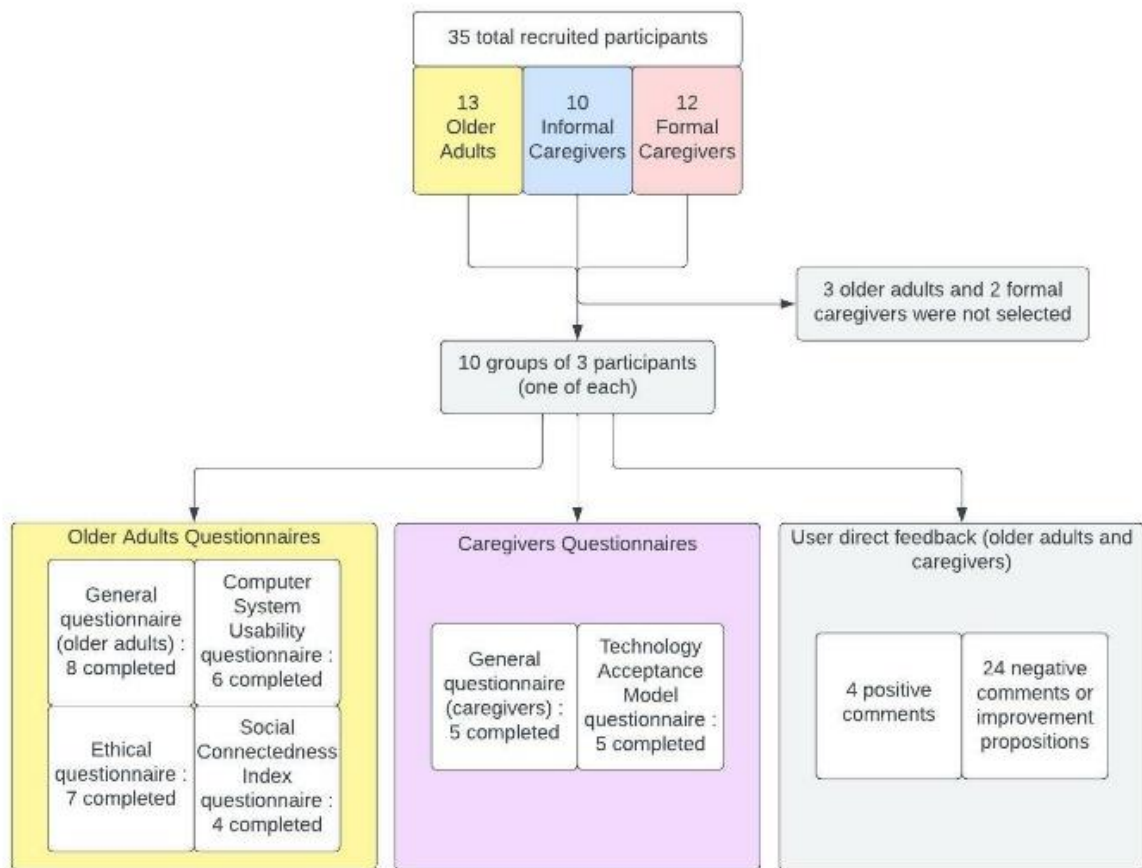


Figure 2: Collected data

The trial period for each group lasted two weeks, during which the robot was installed inside the older adult's home, in the room where they spent the most of their time. Caregivers were asked to set up regular reminders and requests during the installation and then adapt them as required during the testing period. Daily interaction through Guardian was asked of every participant, whether to self-report and interact with the robot or check results and adapt reminders. Participants' feedback on the Guardian system was then collected using various questionnaires detailed in the Material section below. These questionnaires were filled out by seniors and their caregivers after the testing period. Participants were also invited to share comments and suggestions for improvements that were recorded and can be seen in the Results section. As the number of total collected questionnaires was fairly low, a thematic analysis was conducted on the qualitative dataset to better represent the collected data.

Material

In order to get relevant feedback from the seniors and their caretakers, different questionnaires were submitted to them. First, the seniors had to fill out a general questionnaire (Table 1) about a variety of subjects relating to the Guardian system's helpfulness in regard to the everyday activity of the older adult. A Computer System Usability Questionnaire (Lewis, 1995) (Table 2) was then used to evaluate how easily and efficiently the system could be used by the older adults. Both of these questionnaires were rated from 1 (*strongly disagree*) to 7 (*strongly agree*). To those were added an ethical

questionnaire (Table 3), mainly focused on safety aspects. A Social Connectedness questionnaire (Table 4) was also filled out to better understand how Guardian helped the older adults feel connected to their caregivers. The items of this second set of questionnaires were rated from 1 (*strongly disagree*) to 5 (*strongly agree*).

The caregivers were submitted two different questionnaires, without distinction between formal and informal caregivers. The first is also a general questionnaire (Table 5), with questions regarding the subjective helpfulness of Guardian to the caregivers; it uses the usual item rating system from 1 to 5. The second caregiver questionnaire used the Technology Acceptance Model (Lai, 2017) (Table 6) to assess the accessibility and usability of Guardian; items were rated 1 to 7 by the participants.

For each questionnaire, the mean (either “3” for 5-points questionnaires or “4”, for 7-points questionnaires) represents “neither agree nor disagree”.

The particular items relative to each questionnaire can be found in the tables of the Results section.

Results

Senior’s Point of View

Helpfulness.

The data recovered from the general questionnaire submitted to the seniors (Table 1) seems to indicate that the efficiency expectations were not met. Seniors did not find Guardian to be helpful in most surveyed everyday activities such as being more active ($M=2.875/7$), taking medication on time ($M=3.375/7$), and eating and drinking enough ($M=2.25/7$). Most seniors did not find Guardian to be helpful in feeling less lonely ($M=3.625/7$), feeling more independent ($M=1.875/7$) or following a daily routine ($M=2.75$). Some seniors did find Guardian to be helpful in informing caregivers about their wellbeing ($M=4.375/7$).

Usability.

The answers given to Computer System Usability Questionnaire (Table 2) show that seniors were mainly satisfied with the accessibility Guardian ($M=4.7/7$), and appreciated the organization of the information on screen ($M=5.3/7$) as well as the clarity of the information provided with the system ($M=5.2/7$). The main problem seems to be the error messages which did not clearly tell the seniors how to fix problems when they occurred ($M=2.8/7$).

Ethical Concern.

The ethical questionnaire results (Table 3) show that the seniors felt safe using Guardian ($M=5/5$) and thought the data collected by Guardian well protected ($M=5/5$). Most seniors agreed that the robot was not time consuming and saved time ($M=4/5$) but most seniors still found Guardian not to be in line with their expectations ($M=2/7$).

Social Connectedness.

Seniors were also asked to evaluate their social connection to the caregivers through a Social Connectedness Index questionnaire (Table 4). The collected data indicated that seniors felt both formal and informal caregivers close to them ($M=5/5$ and $M=5/5$) with the help of Guardian. Moreover, they felt mostly safe ($M=4.75/5$) as well as supported and understood by the network including caregivers and the Guardian system ($M=5/5$).

| Item | Score, mean | n |
|---|-------------|---|
| Using Guardian helps me to take my medication on time. | 3.375 | 8 |
| Using Guardian helps me to become more active. | 2.875 | 8 |
| Using Guardian helps me to eat and drink enough. | 2.25 | 8 |
| Guardian system helps me to make me feel less lonely. | 3.625 | 8 |
| Using Guardian helps me to feel more independent. | 1.875 | 8 |
| Guardian helps me to have a daily routine. | 2.75 | 8 |
| Guardian helps me to inform my caregivers about my wellbeing. | 4.375 | 8 |

Table 1: General questionnaire (seniors), items rated 1 to 7, 7 being “strongly agree”, average is 4.

| Item | Score, mean | n |
|---|-------------|---|
| Overall, I am satisfied with how easy it is to use the Guardian system. | 4.7 | 6 |
| It was simple to use the Guardian system. | 4.5 | 6 |
| I could (effectively) successfully complete the tasks and scenarios using the Guardian system. | 5.3 | 6 |
| I was able to complete the tasks and scenarios quickly using the Guardian system. | 5 | 6 |
| I was able to efficiently (quickly) complete the tasks and scenarios using the Guardian system. | 4.2 | 6 |
| I feel comfortable using the Guardian system. | 4.2 | 6 |
| It was easy to learn to use the Guardian system. | 5 | 6 |
| I believe I could become productive quickly using the Guardian system. | 3.8 | 6 |
| The Guardian system gave error messages that clearly told me how to fix problems. | 2.8 | 6 |
| Whenever I made a mistake using the Guardian system, I could recover easily and quickly. | 3.8 | 6 |
| The information (such as online help, on-screen messages, and other documentation) provided with the Guardian system was clear. | 5.2 | 6 |
| It was easy to find the information I needed. | 5 | 6 |
| The information was effective in helping me complete the tasks and scenarios. | 4.5 | 6 |
| The organization of information on the Guardian system screens was clear. | 5.3 | 6 |
| The interface of the Guardian system was pleasant. | 5 | 6 |
| I liked using the interface of the Guardian system. | 4.7 | 6 |
| This Guardian system has all the functions and capabilities I expect it to have. | 3.8 | 6 |
| Overall, I am satisfied with the Guardian system. | 5.3 | 6 |

Table 2: Computer System Usability Questionnaire, items rated 1 to 7, average is 4.

| Item | Score, mean | n |
|---|-------------|---|
| I think that the final product is in line with my expectations. | 2 | 7 |
| I received enough and satisfactory information to provide my consent and authorization. | 5 | 9 |
| I feel safe when using Guardian. | 5 | 9 |
| I think that the data collected by Guardian are well protected. | 5 | 9 |
| The robot is not time consuming, but saves time. | 4 | 7 |

Table 3: Ethical questionnaire, rated 1 to 5, average is 3.

| Item | Score, mean | n |
|--|-------------|---|
| I feel formal caregivers close to me. | 5 | 5 |
| I feel informal caregivers close to me. | 5 | 5 |
| I feel supported and understood by the homecare network. | 5 | 5 |
| I feel safe with the Guardian's care network. | 4.75 | 4 |

Table 4: Social Connectedness Index, rated 1 to 5, average is 3.

Caregivers' Point of View

Helpfulness.

Caregivers were handed a first general questionnaire (Table 5) that revealed Guardian was mostly helpful in strengthening the cooperation between the caregivers (M=4/5) as well as feeling more involved in the care of the older adult (M=4.2/5). For some caregivers, Guardian was also somewhat helpful in early detection of problems (M=3.6/5) and offered some “peace of mind” (M=3.6/5).

Technology Acceptance.

The data from the Technology Acceptance Model questionnaire (Table 6) indicates that caregivers found Guardian fairly easy to use (M=5.4/7). Some agreed it was easy to become skilful at using Guardian (M=5/7) and felt confident finding information in the system (M=5/7). It appears Guardian did not significantly increase productivity (M= 4.2/7) nor made work much easier (M=4.2/7). Even so, some caregivers agree that working through Guardian is a good idea and a wise idea (M=5/7); caregivers were globally positive towards Guardian (M=5/7).

| Item | Score, mean | n |
|---|-------------|---|
| Using Guardian helps me notice something is wrong in an early stage | 3.6 | 5 |
| The Guardian system offers me peace of mind | 3.6 | 5 |
| The Guardian system helps me to feel more involved in the care of the older adult | 4.2 | 5 |
| Guardian helps me feel more equal in a conversation with a (in)formal caregiver | 3 | 5 |
| Guardian strengthens the cooperation between caregivers | 4 | 5 |

Table 5: General questionnaire (caregivers), rated 1 to 5, average is 3.

| Item | Score, mean | n |
|--|-------------|---|
| I find Guardian system easy to use. | 5.4 | 5 |
| Learning how to use technological tool is easy for me. | 5 | 5 |
| It's easy to become skilful at using the Guardian system. | 5 | 5 |
| Guardian system would improve my working performance. | 4.8 | 5 |
| Guardian system would increase my productivity. | 4.2 | 5 |
| Guardian system could make care work easier. | 4.2 | 5 |
| Working through Guardian system is a good idea. | 5 | 5 |
| Working through Guardian system is a wise idea. | 5 | 5 |
| I am positive towards Guardian system. | 5 | 5 |
| I intend to check announcements from Guardian system frequently. | 5 | 5 |
| I intend to be a heavy user of the Guardian system. | 4.3 | 5 |
| I feel confident finding information in the Guardian system. | 5 | 5 |

Table 6: Technology Acceptance Model (TAM) questionnaire, rated 1 to 7, average is 4.

User Direct Feedback: Themes

Positive Comments.

In regard to the qualitative approach of the analysis, participants were invited to share their thoughts and comments about Guardian: various positive and negative points were thus brought up, and many improvement ideas were offered by the users.

Shared Information.

It seems that participants liked the ability to share data efficiently between the older adult and the caregivers, as well as between the caregivers themselves. One user added that it provided the older adult with a sense of security. One older adult also liked being able to easily consult appointments:

The information shared with the network is relevant and provides the older adult with a sense of security.

It is nice to be able to consult appointments.

Company.

One participant acknowledged the benefits of having “a presence”. The company the robot provided was appreciated and one of the users saw some psychological benefits to using a social robot such as the Guardian’s Misty. A caregiver felt it was nice the older adult had to care for the robot, as it also provided the senior with a feeling of company:

The robot almost has a human contact, it is a presence.

The robot feels like a buddy, because seniors have to care for it.

The robot has some psychological benefits, even if the system is not smart enough to have better interactions with the senior.

Negative Comments and/or Improvement Propositions.

Many concerns were formulated, notably regarding the technical bugs and limitations of the Guardian system. User experience, interaction, limited actions and safety were the main topics of concern for seniors and caregivers.

User Experience.

Participants felt user experience could be improved on different points such as the ability to “postpone reminders when the senior is not at home”. A commentary was made on the effective weight of the robot, deemed “too heavy” for frail seniors to manipulate. It was thought that user accessibility could be improved for both caregivers and seniors: “caregivers don’t like having to use a computer, an app should be available” and “it is hard for seniors to use the tablet properly”. One user also felt the user manual should be clearer. A caregiver found the identification information too complex for the older adults, as it impaired the accessibility of the system:

Older adults’ IDs are too complicated and source of bad user experience.

Older adults should be able to change the language of the application.

The robot is too heavy for seniors to carry.

The reminders should be postponed when the older adult is not at home.

The Guardian system should be able to figure out whether the senior is at home or not.

The tablet can be difficult to use for some older adults, and this can prevent the entire system from functioning correctly.

The user manual is not clear enough, it should contain only relevant information.

Interaction.

Interaction with the robot was judged insufficient by some participants who felt Guardian should be able to audibly formulate questions and answers and found the emotion recognition ability of the system and reactions below expectation: “the robot should ask a question when recognizing the senior’s emotion.” Some participants also pointed out that interaction with Guardian would be easier through exclusively vocal commands and that it would help the interaction remain natural:

The older adult can speak to the robot, but the robot cannot answer apart from looking at them. The robot is only able to inquire “are you there?”

The robot should be able to ask unprompted questions to the older adult, for example: “Hello [name]! Do you want to know what’s on TV tonight?”

When recognizing the seniors’ emotion, the robot should be able to formulate a question or sentence according to its detection: “You look angry, what’s going on [name]” or “Wow! Seeing you happy makes me happy!”

The robot should be able to show a happy or in love eye expression when it recognizes the senior.

End-users do not want to use a tablet anymore.

The interaction should remain natural: speaking not clicking.

Accessibility.

Other participants found some actions limited: “the older adult should be able to input their own appointments” instead of requiring a caregiver to do so for them. Self-reports were thought to be too succinct and not enough freedom was permitted in those reports: “seniors should be able to do more self-reports than only meal and medications reports”:

The older adult should be able to easily decide who can reach the information gathered by the system, depending on simple robots' questions.

The older adult should be able to enter their own appointments on the tablet, it's complicated and frustrating to have to go through somebody else.

The older adult should be able to know who put the reminders/requests and be allowed to contact them through the Guardian system.

Activity suggestions are not available in the tablet but should appear like the appointment functionality.

Older adults should be able to do more self-reports, apart from saying how they are doing and how they have slept, for example medication or meal self-reports.

Safety.

Lastly, some concern arose regarding safety. Caregivers thought “Guardian should be able to recognize if the senior has fallen” and found the system’s field of view of the too limited. It was also noted that the battery life and management of both the tablet and the robot could be complicated to some:

There should be a feature allowing to see if the older adult has suffered a fall or it should be connected to other tools which detect falls?

Frail seniors can be in danger if they have to rely too much on reminders and requests in their everyday life.

The robot should be able to recognize the older adult from further away; the robot would not recognize the older adult from more than 2 meters away.

The system should help older adults better understand their treatment. The senior application should have some practical information.

It can be complex to maintain both tablet and robot fully charged; if tablet runs out of battery the older adult cannot access the system and thus will not receive any reminders, etc.

Discussion

Principal Results

Globally, the Guardian system in its actual state seems to be more helpful to the caregivers than to the seniors. The results of the Social Connectedness Index questionnaire and the general questionnaire seem to indicate that even though some seniors found the system helpful to stay in touch with their caregivers, the other functionalities did not appear to meet their expectations in terms of helpfulness in everyday activities. Since reminders and activity suggestions are set up by the caregivers, it is possible that this was partly due the number of set reminders being too low. It is clear that Guardian did not help the older adults feel more independent nor have a daily routine, but the ability to inform caregivers of their actual state was appreciated by some of the older adults. In terms of usability, the Computer Usability questionnaire highlighted the main problem to be about error messages: they did not help fix problems that older adults encountered while using Guardian. Overall, it appears that older adults were not truly convinced of how easy it was to use Guardian, with a mean of 4.7 out of 7 (n=6). It seems the main positive points for the seniors are that they feel safe using Guardian, and that they feel well included in the homecare network: they feel close to both formal and informal caregivers.

As for the caregivers, results of the general questionnaire show that they appreciate the improved collaboration between formal and informal caregivers Guardian allows for. The impact of the Guardian system on the workload also seems to be an important point for the health professionals even if it did not help as much as it was thought it could. Again, this might be due in part to the robot being only accessory in the care process for professional caregivers that may not have relied on Guardian as much as it could have been expected. In any case, the Technology Acceptance Model questionnaire revealed that caregivers found the system rather easy to use. They also found Guardian to be a somewhat *good* and *wise* idea. Caregivers were mostly positive towards using Guardian. Even so, it appears formal and informal caregivers did not really intend to use the Guardian system if it was commercialized (mean of 4.3 out of 7 [n=5]).

In any case, the early test revealed that both seniors and caregivers expect more from a social robot than what was offered by Guardian. Some of the direct feedback shows that accessibility is key and that users would rather use the robot mainly with voice commands; that would probably allow for improved usability and a smoother interaction between the older adult and the robot. This is at least what was expected by the users.

Future Directions

In order to improve the Guardian system user experience, different functionality and accessibility issues, described in the Results section, will have to be addressed. For example, the human-robot interaction can be improved so that the robot is accepted better by older adults and caregivers alike. As for the testing process itself, many issues specific to the real-life conditions arose during this stage and impacted the involvement of some of the participants. One of the main problems of this kind was that some users encountered bugs which were not fixed right away; this discouraged some from testing further. To prevent this during the next testing phase, a closer follow up of the system shall be implemented so that seniors are not so easily stuck with functionality issues and bugs that would discourage them from using Guardian.

Strength and Limitations

A key aspect of this early test design was the inclusion of caregivers, formal and informal, to the evaluation process. This helped broaden the spectrum of the collected data and include very different points of view on the Guardian system functionalities. The user-centered approach including different health providers helped us develop the next prototype to better fit the expectations of both older adults and caregivers.

Another strength of this testing phase is the conditions in which it was conducted. Indeed, the real-life setting of this test allowed us to uncover features that needed to be implemented on the next prototype. The uncontrolled testing environment proved very beneficial to the development process of the Guardian system.

As for the limitations of this evaluation, the main limitation may be the number of participants that actually fully completed the testing phase and the questionnaires. Even if the qualitative approach of the data yielded useful and relevant results, the evaluation could have used more answers the questionnaires in order to get a better representation of the general opinion on this digital tool. The low number of participants was probably due to difficulties encountered during the recruitment process combined with some of the problems that users encountered while using Guardian. The real-life conditions of the test brought usability problems that were not expect and which appeared to have discouraged some of the participants.

Conclusion

In conclusion, it appears that older adults and caregivers alike are ready to start using digital tools within the homecare process. It is clear that the expectations toward robotic technology are very high and that Guardian failed to meet some of these expectations, for example the fully automated voice command, or the expected level of interaction provided by the robot. On account of those high expectations, the Guardian system is still perceived as a work in progress by some of the users, but could certainly be made an interesting tool for caregivers and seniors alike with some of the discussed improvements and corrections.

Acknowledgments

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Conflicts of Interest

None declared.

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