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Care, Monitoring, and Companionship: Views on Care Robots from Older People and Their Carers

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Abstract This paper is a discussion of some of the ethical issues relevant to the use of social robots to care for older people in their homes, drawing on qualitative data collected as part of the Acceptable robotiCs COMPanions for AgeiNg Years (ACCOMPANY) project. We consider some of the tensions that can be created between older people, their formal (professional) carers, and their informal carers (for example friends or relatives), when a care robot is introduced into the home of an older person. As examples of these tensions, we discuss the use of the care robot as a monitor of older people and carers, for example to ensure older people's compliance with healthcare regimes, or to police the behaviour of carers to ensure that they are complying with professional guidelines. We also consider the use of care robots in a companionship role for older people, and describe the importance of clearly-delineated roles for care robots. The paper concludes that older people's autonomy can be limited in the short term in order to protect their longer-term autonomy, and that even if care robots should primarily be considered as being for healthcare rather than for companionship, they might still be used sensitively so that their interference with the companionship role is minimised.

Keywords care robots, older people, monitoring, qualitative data, companionship, health

1 Introduction

This paper will discuss some of the ethical issues relevant to the use of social robots to care for older people in their homes. We will draw on qualitative data collected as part of the Acceptable robotiCs COMPanions for AgeiNg Years (ACCOMPANY) project in order to identify potential ethical tensions and avenues for discussion. Our data provide a novel contribution to the extant literature on the role of care robots for older people [1-3]. We will show that assisting older people and their carers may often not amount to the same thing, because there can be serious tensions between older people and their carers that can be exacerbated by the introduction of a robot. This also includes tensions between different *types* of carer, specifically formal carers (professionals) and informal carers (friends, relatives or volunteer carers). Hence, this paper will consider the ethical issues surrounding the introduction of a robot as a fourth member into an already potentially conflict-rife care triad.

We will discuss the effect on these conflicts of using the robot to monitor the health and health-related behaviour of older people, and also of using it to police the behaviour of those that care (in both a professional and informal capacity) for older people. The extent to which the robot can act as a monitor, and the question of who should be able to access information that the robot collects, are relevant to the robot's *role*. For instance, whether it should be perceived as an extension of healthcare professionals, or whether it has a separately-defined role as a companion to the older person such that it can legitimately withhold information from healthcare professionals. The paper will conclude by recommending that designers of social robots should consider the impact that robots' design features will have on these ethical issues.

1. Method

The qualitative study involved 21 focus groups, with 123 participants in total. There were three different types of participant group: older people between the ages of 62 and 95 (OPs); formal carers (FCs) of older people (for example paid healthcare professionals); and informal carers (ICs) of older people (for example friends or relatives who cared for older people on a voluntary basis). The three different types of group were chosen to reflect three types of stakeholders who are often involved in care triads. These focus groups were conducted in the United Kingdom, France, and the Netherlands. Our data were collected as the one of six user-interactions planned over the life-time of the ACCOMPANY project. Our participants were drawn largely from the established ACCOMPANY user panels in the three countries. Some participants had already taken part in previous ACCOMPANY interaction. In France, Maintien en Autonomie à Domicile des Personnes Agées (MADoPA) convened each type of group three times (n=9). In the Netherlands, Zuyd Hogeschool (ZUYD) convened two of each group type (n=6). In the UK, the University of Hertfordshire (UH) convened one of each group type (n=3). These proportions reflected the plans for user interactions for the project as a whole. Finally, the University of Birmingham (UB) convened only older people groups (n=3). These were additional groups not envisaged at the time of the funding application.

The focus groups were all run using the same scenarios and single, uniform topic guide. Participants were presented with four scenarios to elicit views and opinions and stimulate discussion on potentially ethically dilemmatic subjects. The scenarios were designed to bring out tensions between ethical principles that had been anticipated in the ACCOMPANY ethical framework for the use of robots in the care of older people (which is reported in Sorell and Draper [4]). The aim was to explore framework against the views of the participants in the qualitative study, using the tensions as the starting point, in order to produce a revised version that was empirically-informed as well as philosophically robust. These scenarios can be seen in table 1 below.

Each focus group was conducted in the participants’ native language, with the scenarios being presented in their native languages also. The topic guide was used (see appendix 7 of Draper and Sorell [5]) to ensure consistency across the different groups. The focus groups were audio-recorded (and sometimes video-recorded also) and transcribed verbatim. A representative transcript from each group type (OP, IC, and FC) run in the Netherlands and France was translated into English. These transcripts were selected because they contained a large number of themes in common with other transcripts, rather than because they contained deviant cases.

All of the English transcripts were then coded (by Draper) using a combination of directed analysis and Ritchie and Spencer’s Framework Analysis [6] (see table 2 below), and then independently checked by a different member of the research team. This means that the themes that emerged were partly determined by the existing ethical principles identified by Sorell and Draper [4], and partly led by the data. Interrogation of the data for codes therefore involved reading the transcripts and generating codes where the data pertained to Sorell and Draper's framework, but also generating codes where the participants' responses introduced concepts that were novel to or went beyond that framework. We were particularly interested in tensions between the principles in the ethical framework, for example where promoting an older person's safety may interfere with their independence. The scenarios were designed to elicit these tensions. We also identified themes in the data that did not arise in the framework – for example, the participants considered genetic relatedness, and discussed whether *who* was intervening to protect an older person's safety had an effect on the legitimacy of that intervention.

The results were discussed with the facilitators at UH, ZUYD, and MADoPA, until an agreement was reached on how to interpret the data and its themes. Inter-rater reliability was not formally measured beyond this process.

MADoPA and ZUYD facilitators then coded the remaining non-English transcripts. Quotations were selected to represent the coded and agreed thematic interpretations. Care was taken to note deviant cases. The resulting analyses were presented in a report, which was then circulated to and verified by all of the facilitators. Using this process, all 21 transcripts were included in the analysis even though not all were translated. The overall methodology of integrating philosophical work and empirical data in this way is known as 'empirical bioethics' [7, 8].

This paper will not present the full set of results from the study. Other study results relating more generally to design feature and a more detailed account of the study method, and some results pertaining to robotic responses to rudeness, can be found in Draper et al. [9] and in Draper and Sorell [10] respectively. This paper will describe and explore in detail those results that pertain specifically to the ethical issues related to the place of the robot in the care triad, exploring these issues in greater depth, and with reference to philosophical arguments. A greater number of themes from the data will be reported here, including the novel finding that genetic relatedness seems to play a part in care hierarchy.

Table 1 Brief description of scenarios

Scenario	Brief description
1. Marie	Marie (78) resists the robot’s efforts to encourage movement that will help her ulcers to heal. She likes it reminding her to take her antibiotics but not its reminders to elevate her leg. She is not honest with her nurse about how much she is moving.
2. Frank	Frank (89) is socially isolated. His daughter wants him to access an on-line fishing forum with the help of the robot. He isn’t keen to try.
3. Nina	Nina (70) has recovered from a stroke. She is rude to her daughter and carers (causing them distress) but not her friends. The robot is programmed to encourage better social behavior by refusing to cooperate when she is rude.
4. Louis	Louis (75) likes to play poker online using the robot. He uses its telehealth function to monitor/control his blood pressure. He doesn’t let the robot alert his informal carers when he falls (which he does regularly, usually righting himself). His informal carers want to re-program the robot so it will not let him play poker and to alert them when he falls.

Table 2 Use of Ritchie and Spencer’s Framework Analysis

1) **Familiarization** – data immersion: reading the transcripts several times.
2) **Identifying a thematic framework** – coding the data using a combination of descriptive, in vivo, and initial coding [11]. Descriptive codes referred to the values outlined in the ethical framework, hence hybrid between Framework and directed approach.
3) **Indexing** – an approach similar to constant comparative analysis [12] was used in sorting the quotes, searching for correlations and contradictions between quotes.
4) **Charting** – involved thematic organization of the quotations, which provided a systematic way to manage data directly relevant to answering the research aims/questions.
5) **Mapping and Interpretation** – involved creating a mind map of the data’s main themes, subthemes and their connections, thereby bringing the data set together as a whole in each group.

Adapted from Draper et al. [9].

2 Results and Discussion

The richness of the dataset means that the data is relevant to a number of ethical discussions. This paper will discuss only a subset of the results: those relevant to ethical issues relevant to the introduction of the robot as a new member in a network of stakeholders and carers. The results in relation to the main aim of the study have yet to be published. The rich dataset the focus groups produced has enabled us to report results relating to different themes in different papers. Given this, the results and discussion will be presented concurrently instead of presenting results upfront, so that the relevance of the selected quotations to the discussion is more immediately obvious.

2.1 The Care Triad

2.1.1 Conflicts Between the Interests of Older People and the Interests of Carers

Sharkey and Sharkey [13] list three uses of care robots in the context of caring for older people. The first is 'to assist the elderly and/or their carers'. Unpacking this concept reveals some interesting ethical tensions at play in the introduction of care robots into the homes of older people. First, it may suggest that assisting older people and their carers amounts to the same thing. This, however, may not be the case, as something that assists an older person may be detrimental to their carers' interests. A robots' assisting an older person to obtain an alcoholic drink may worsen an older person's health, increasing the amount of care that needs to be provided for them by humans later.[1] The effects of caring on carers themselves are acknowledged by other authors [20, 21], and indeed a later paper by Amanda Sharkey appears to move towards acknowledging this nuance: '[a]ssistive robots are robots designed either to help older people to overcome some of the problems of aging, or to help the carers of older people' [22].

In the focus groups, the scenario of Louis, an older person who uses the robot to gamble on the internet, served as an example of this tension between older people's interests and carers' interests. Here, the robot empowers the older person and serves his desire to gamble. Some participants in the OP and IC groups felt that it was up to Louis to take responsibility for his wider financial interests when using the robot in this way:

> *Concerning the gambling he says he's in charge of his own money and I have to agree with him...* (ZUYD OP1 E3)[2]

> *He can't live completely withdrawn into himself even if it's all he wants for now, at least that's how I feel* (MADoPA IC1 P5)

This was usually supported by the FC participants, who added that this kind of decision-making was up to the

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[1] It might be argued that giving an older person an alcoholic drink that will harm their health does not really count as assisting them, even if it is consistent with their desires. Whether we conceive of "assistance" as being interest-based or desire-based, it remains the case that assisting an older person may conflict with assisting their carer(s). For simplicity's sake, this paper will use "interests" broadly, to refer to both the satisfaction of desires or preferences, and benefit that may be independent of desires (such as pleasure), therefore ignoring the fact that desires and interests are distinct and can diverge and conflict (as is widely recognised in the relevant philosophical literature [14-19]). For our purposes here it is sufficient to say that furthering an older person's desires *or* interests may conflict with the desires and/or interests of their carers. For a discussion of conflicts between older people's desires and their interests in the context of care robots, see Sorell and Draper [4].

[2] Quotations will follow this format: the site name is reported first, then the focus group, and finally the individual participant code. This is with the exception of quotations with multiple speakers, in which case participants will be identified as they speak.

older person themselves as long as they had mental capacity:

> P5: *It does not anywhere say he is mentally limited*.
> P4: *Exactly, that is why*
> P2: *He is not addicted to the gambling* (ZUYD FC1)

There was, however, suspicion amongst some group participants that an IC's decision to stop Louis from using the robot to gamble may be grounded in their own interests rather than those of Louis:

> *And you also have to take into account that there are children who will try and curb their parents' spending because it's part of their inheritance going out of the window! So, given the facts we have here, it's a difficult question* (MADoPA FC1 P7)

> *The daughters also could think of their own benefits. If he spends all of his money their inheritance will not be as much* (ZUYD FC2 P7)

Interestingly, it was participants from the OP groups who considered that this motivation may actually be legitimate:

> *Everyone has to be considered, because the children are the ones who have to pick up the pieces afterwards, aren't they.* (MADoPA OP1 P3)

> [H]*e could end up with a huge debt you know that's gonna cause problems in fact doesn't it. I don't know where he lives, let's assume that he is in his own house and he gets into a huge debt and the house has to be sold and he's got to go somewhere else. All these things follow on you know if you got drink problem you get into debt, drunk or you get into debt, he could lose thousands and thousands of pounds. I think then it does become a family problem.* (UH OP P4)

This may lend some support to the view that informal carers such as family members should be allowed control over the robot, or at least that the robot should be designed or programmed in such a way that their interests are taken into account. The interests of carers may be legitimate to different degrees. Thus consideration must be given to how much these interests should be allowed to infringe on those of older people, and in which situations.

Consideration of the importance of carers' interests was a view that participants continued to uphold outside of the gambling scenario. Scenario four also invited the study participants to discuss whether the robot should alert Louis' carers to his falls. Also the degree of control that Louis should have over the reporting of his falls. Louis can quite conceivably have an interest in controlling this. Indeed, it is sufficient for the account of interests we are using here that Louis only *desires* to have this control, and it is quite plausible that an older person would have this desire. In the scenario, Louis has recently had a fall and been unable to get up for some time, resulting in a bladder infection. The eventual consequence of his fall was the need for additional care from his daughters-in-law. This is a clear case of Louis's interests conflicting with those of his carers.

Some participants were sensitive to the fact that carers, particularly informal carers, could have their interests harmed by older people in this way:

> *Well they're bringing him food, helping him, with his cleaning and doing his laundry so they're actually doing quite a bit and when he was in bed they took it in turns to stay with him during the day ...So I think they've got quite a lot invested in this and so to some extent I think there's a bit of a quid pro quo there* (UB OP3 P7)

> *I also see it when people want to stay living at home then this has consequences. They do not want that, most often, but it does have those consequences.* […] *You cannot force them, but that really has consequences. If he really does not want, what you can do as children is tell him. Then we also cannot take care of you. Because I think these children do a lot for him. Then it is allowed to expect a number of consequences of him.* (ZUYD FC1 P3)

> *In everyone's best interests actually; in his best interests and in the best interests of his family, who won't have to make unnecessary journeys. Who'll come round if he falls?* (MADoPA IC1 P1)

The carers' interests, particularly those of the informal carers, were therefore something that some participants in all groups thought could be justifiably taken into account. Again this offers support to the idea that robots' assistance of older people must be sensitive to the effect that this will have on their carers. This is in contrast to Sharkey and Sharkey's concern: 'Who controls the robots? Are they actually designed to help the elderly person, or to cut costs and reduce the workload of their carers? Often the focus is more on improving the lives of the caregivers, rather than ensuring that robotic assistance is provided in such a way as to improve the lives of the elderly themselves' [13]. Sharkey and Sharkey may be correct that given their vulnerability, care of older people should be a higher-priority consideration than that of the carers. The interests of carers, however, should not be regarded as having *no* weight relative to those of older people. Carers' interests matter too, and in some instances older people's interests should give way to them. This will require a weighing of the importance of the interests of both parties, and doubtless there will be difficult borderline cases. Nevertheless, where a relatively trivial interest, such as an interest in gambling online for leisure, may conflict with a carer's interest in avoiding inheriting debt problems, the trivial interest should be considered to be of lesser importance.

2.1.2 Conflicts between the Interests of Different Types of Carer

So far, the dynamic of the care triad suggests that robots must be used in a way that is sensitive to the interests of carers as well as those of older people. Carers, however, are not a monolithic and homogenous group. Carers can take different forms. This creates another possible nuance in the care triad. Different carers may disagree about how care should be discharged. The qualitative study targeted for recruitment participants who were either formal or informal carers. These different types of carers may have different desires or interests regarding how the care of older people is discharged and how a robot should support this. What is good for one type of carer may be bad for another. Decisions about how to distribute responsibility for discharging the "burden"[3] of care, and what the content of that care is, can affect different types of carer.

Consider again the case of helping an older person to obtain alcohol. An informal carer may make their own life easier by providing a drink for an older relative (for example, to stop them from complaining, or to help them to go to sleep), but if this has a negative effect on the older person's health, it may create a larger care burden in the future. This burden may have to be picked up by the same informal carer, or a different carer, either formal or informal. The triad therefore presents an even more complicated network of different interests and desires. Introducing a care robot can affect these interests and desires. Continuing with the alcoholic drink example, a robot might be able to make it more difficult for the informal carer to provide this drink – say, if it is programmed to report such behaviour back to formal carers. Again, then, the robot has an impact on the dynamics of the care triad. While different kinds of carer can use the robot to protect their interests, this comes potentially at the cost of the interests of other carers.

Given that decisions about how to discharge care may affect different groups in different ways, the question of who is responsible for this decision-making is important. There was some discussion amongst our participants about decision-making with regard to how to care for older people. The Louis scenario described his daughters-in-laws' decision to remove his walking sticks as a means of encouraging him to use his walking frame. There was a concern about whether this move would increase the care burden ultimately, if Louis's response to this was to try to walk around without *any* assistive devices whatsoever. Participants largely felt that this was not a decision that ICs should make by themselves without consulting formal carers:

> *I would have thought that should have been a medical decision, not for the daughters-in-law to decide whether he uses his sticks or his walking frame... I think it should be looked into if he is safe to have his sticks or if he needs a walking frame* (UB OP2 P5)
>
> Researcher: *Are the daughters-in-law allowed to decide this* [replace crutches with walking frame]*?*
> E3: *Wouldn't it be better to ask their doctor to decide on this? If it would happen to me I would*

---

[3] The use of this word is not intended to suggest that carers view the task of caring as burdensome, or that they do not wish to undertake it. Rather, it serves as a convenient term to describe a task for which responsibility must be divided up. This terminology tracks that used by Vallor [23], and her discussion indicates that she is similarly cautious about the use of this term.

> *consult my general practitioner for this* (ZUYD OP2)
>
> P2: *No,* [they] *should have discussed* [removing the sticks] *with the medical staff*. (UH IC)

This suggests that formal carers may be perceived to have greater authority or legitimacy in the triad than informal carers.

In addition to espousing a view that daughters-in-law should not make medical decisions about an older person's care, participants in all groups often sought to distinguish between the daughters-in-law and the sons in their discussion of the Louis scenario:

> *The sons should interfere in this, not the daughters-in-law* (ZUYD IC2 M1)
>
> P1: *I think it should be his sons taking actions not them [the daughter-in-law] trying to control him…*
> P5: *Direct relatives really* (UH OP)
>
> [Louis's gambling] *is also more something for his sons to discuss than for his daughters in law... And then I think it's not up to his daughters in law. You discuss these kinds of things with your children and not with…* (ZUYD OP1 E3)

The relevant difference for these participants seems to be that, by virtue of their genetic relatedness rather than the extent of their contribution to care, the sons are the more appropriate decision-makers. These participants emphasised the relevance of genetic connectedness even in cases where the daughters-in-law, though not genetically related to Louis, undertake the same amount of care as the sons:

> *I do not think you should have daughters in law decide this. I think the sons should talk to the father. Here it [the boundary] has become rather faded because his daughters in law take care of the care as well. That boundary has faded here. But I believe the sons should talk to the father* (ZUYD PC1 P4)

Some of the participants in one of the OP groups considered different reasons for suggesting that Louis's sons should have greater involvement with his care than his daughters-in-law. In some cases it would be easier for men to deal with physical problems, such as having to pick Louis up after a fall, or dealing with (male) nakedness:

> P1: *But it should be the sons because apart from anything else it's quite difficult gender wise. You know if he is fallen, I mean* [name] *fell, you fell once didn't you? Getting in the shower. He had nothing on. You know.*
> P2: *I think it would be easier for the son to come and pick him up than for the daughter-in-law.*
> P1: *Exactly* (UH OP)

It would be interesting to reverse the genders in the example in order to further explore how the participants would balance practical concerns like being able to lift a person against values such as the view that genetic relatives should have more rights and responsibilities than marital relatives.

Another practical suggestion regarding why sons should have more involvement was related to the compliance of the older person with requests, with some participants in one of the IC groups thinking that sons would have more sway over the older person than daughters-in-law:

> M3: *Yes, because the sons can say more to their father than his daughters in law. He will listen to them better.*
> M6: *Yes, I think so too* (ZUYD IC1)

The suggestion here might be that while sons have no more of a *right* to influence the direction of care than the daughters-in-law, their influence may be more effective. This increased effectiveness could suggest an assumption amongst these participants that older people will themselves favour genetic relations over others.

Our study data therefore suggests that while some participants were sensitive to the interests of informal carers, views were expressed that suggest this sympathy did not extend to allowing informal carers to make medical decisions. This may have important ramifications for who is allowed to control the robot. It must be remembered, however, that not all uses of the robot may be considered medical, and so there may still be room for informal carers to have some legitimate control over the robot. However, our participants preferred decisions in general (medical or otherwise) to be made by those with a more direct familial connection. Crucial to allowing any kind of informal carer to control the robot, however, is the possibility that diminishing older people's control may increase the likelihood of their rejecting the introduction of the robot altogether [24].

2.2 Monitoring

Sharkey and Sharkey [13] note the possibility of using the robot to monitor behaviour. They describe a range of monitoring activities. These included: issuing reminders to older people about health and health-related behaviours (taking medicines or using the toilet); checking for emergency situations (such as falls) and alerting carers when these situations occur.

2.2.1 Monitoring Carers

The use of the robot as a monitor was mentioned above as something that can have an impact on the care triad. Older people themselves are usually regarded as the primary target of robotic monitoring. Some of our FC participants, however, noted that it may also be used to monitor *them*:

> P4: *I think it's all very 'Big Brother is watching you' if you have such a thing in your home and it can be programmed at all times to turn against me.*
> P1: *Yes. You could look at it like that.* (ZUYD FC2)

This point could be broadened to include the monitoring of the provision of care from whatever source, and could take many forms. One example might be monitoring informal carers' to ensure that they are not encouraging or facilitating non-compliance or non-adherence in older people (consider again the alcoholic drink example). Alternatively, formal carers themselves could be monitored to ensure that they are discharging care in ethically and legally justifiable ways, so as to minimise abuse or neglect cases of the kind reported by O'Keeffe et al. [25], Cooper et al. [26] and as described and considered by Sharkey [22]. Conversely, however, the presence of a robot to monitor the care delivered by a formal carer may, if this is known to the older person, undermine the faith that this older person then has in the carer. This may particularly occur in a culture where the use of robots for this purpose is not widespread.

2.2.2 Gathering and Sharing Health Information

Another possible set of benefits from using the robot as a monitor could be generated by sharing health information with carers so that they can better discharge care. A robot may be used to note down health information about a patient and pass it on (for example, taking blood pressure measurements). This may save the time of formal carers so that they can prioritise other things. This runs into ethical difficulties when we consider whether *in*formal carers should also have access to this information. It is possible, as some of our participants noted, that this is information that they would get anyway, if the robot was not present:

> *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 IC1 M6)

This reveals a tension. One hand, it seems like a robot should not pass information to someone who is not a formal member of the older person's healthcare team, for reasons of confidentiality. On the other hand, however, if the robot gathers information that would otherwise be gathered by or available to an informal carer, the robot has *replaced* the informal carer. This may lead informal carers feel as if they are *below* the robot in the care hierarchy. This displacement may foster resentment amongst informal carers, which may impact negatively on the older person's care.

Robotic monitoring must to be sensitive to the perceptions of informal carers. The robot should work with, rather than in competition with, them. This co-operation could take the form of supplementing the care that informal carers provide. Alternatively, the robot could be used only in those areas that informal carers identify as ones in which help is required. The idea of robots working alongside informal carers speaks to the general idea that robots should be designed in such a way as to *improve* the care of older people. The fear that robots will cause informal carers to *withdraw* their care is one that should be taken seriously. The withdrawal of care by informal carers could have the effect of shifting the burden onto formal carers, or of reducing the overall degree of care the older person receives, or both. It may also have the undesirable effect of reducing the older person's social connectedness.

While Sharkey and Sharkey [13] worry that one possible downside of using robots for monitoring is that it may constitute an invasion of older people's privacy, some members of the OP groups in the qualitative study thought that the robot's sharing information, at least with formal carers, was a positive thing:

> *Yes* [the robot should tell the nurse], *because otherwise there is no point having the robot doing these things.* (UH OP P2)

> *I mean if it if it relates directly to the care of the individual then, yes* [the nurse should be able to get information from the robot] (UB OP1 P4)

Indeed, one view was that robots may be more reliable than humans when it comes to recording healthcare information:

> *They cannot cheat, right? ... That is the difference. The measures are taken and the robot sends them on to the physician. So there is no possibility to add a few degrees, or make it some degrees less.* (ZUYD FC1 P2)

The mistrusted party may just be older people and informal carers here, but it is possible that these participants were concerned that formal carers too could manipulate (deliberately or accidentally) data or information in this way.

2.2.3 Monitoring as Potentially Intrusive

Participants reflected the fear of monitoring being used in a very intrusive and forceful way. This is related to the concerns described in subsubsection 3.1.2 above about the power dynamic in the care triad being shifted by the use of the robot. The below quotation is representative of the concern about informal carers "forcing" issues by way of the robot:

> *Sometimes, people's children want to force things upon their parents and in the end, instead of having an aid that perhaps was inadequate, they don't use anything at all* (MADoPA FC1 P7)

Our participants appeared to be sympathetic to the invasiveness and privacy issues as noted by Sharkey and Sharkey [13] and Sparrow and Sparrow [27]. For instance, they considered different, less intrusive ways that the robot could use information to report back to carers about the patient's adherence to healthcare:

> *They could look at the print out together, that wouldn't be quite as invasive as the robot saying: 'Actually she didn't do that when I told her three times and she didn't get up!'* (UH FC PF)

Further to this, a potential avenue for limiting the intrusiveness would be to allow older people to decide for themselves, in advance, what is done with information about them, so that their autonomy and control is retained [4]. For example, an older person may decide that the process of carers obtaining information from the robot should be undertaken with the older person present, again to diminish the extent to which they feel disempowered or deceived by the process. These decisions could be revisited at intervals to ensure the continuing autonomy of the older person.

It seems legitimate for a robot to be used to police the care of older people. Older people should not be subjected to poor care or neglect from either ICs or FCs. Our OP participants did not seem to object to the robot being used to monitor health and pass information to FCs. But whether surveillance that lies between these two ends of the data-collection spectrum is policing or monitoring may be a matter of perspective that may reflect reasonable differences of opinion on what care to deliver and how. Ideally, differences of opinion and conflicts of interests in the care triad can be resolved by compromise and negotiation:

> *And how one gets to that end result, maybe a mix of you know, input from the nurse, further explanation, encouragement from other people might pop in, or I don't know. That's what I would be hoping for is this, you know, some*[one] *being able to understand the importance of what is needed.* (UH FC PB)

This data may also provide an insight into how these participants thought the robot would be perceived. If the only purpose of the robot's collecting information is to pass this information onto a formal carer who can then use it to alter or guide the care pathway of the older person, then the implicit suggestion is that the robot should not make these alterations itself. In this respect it has the same status as participants suggested for informal carers. This may suggest that participants did not see the robot as authoritative or sophisticated enough to be efficacious when it came to reprimanding an older person for non-adherence. Or perhaps they did not see it as competent to make decisions for itself about the care pathway and that such decisions should always go through a human carer. The power that is given to the robot itself, then, may need to be supplemented by human input, especially where important medical decisions are concerned.

3.3 Companionship and the Robot's Role

The question of how much monitoring, reporting and policing a care robot should do may be partly answered by way of a discussion about the *role* of the robot. If the robot is primarily intended to be an extension of the healthcare team, it may be legitimate for it to report non-adherence on the part of the older person for whom it is providing care. On the other hand, if the robot has a role as a companion to the older person, and this role brings psychological and social benefits to older people, this benefit may be undermined if the older person does not trust the robot not to pass information on to the care team.

Our contention is that while companionship elements are important, there is a concern from Sparrow and Sparrow [27] that robotic companionship may come to replace human companionship. Diverging from Sparrow and Sparrow, we do not argue that this would be bad in itself, but rather only insofar as robotic companionship is less psychologically and socially rewarding for older people than is human companionship. This means that we do not think there is anything *inherently* worse about companionship with robots than with humans. This seems plausible. As Broadbent et al. [28] have discussed, these attitudes towards robots may be subject to a variety of factors, including individual and cultural differences amongst the older people involved. For example, they cite a study that found that ‘Japanese respondents thought that humanoid robots were more capable of emotions, could be considered more like humans than tools, and believed more strongly that robots could fulfil a communication role in the home, compared to other ethnic groups' [28]. Unfortunately the study did not collect data from European participants, so conjecture about where Europeans would fit in this spectrum would be somewhat speculative.

Possibly in the future people *will* gain similar levels of social and psychological benefit from robots to the benefits that they gain from humans. The use of therapeutic robots like Paro the seal demonstrates that they are used to play a therapeutic role (see http://www.parorobots.com). This may, however, pale in comparison to the therapeutic role of social relationships with humans. This, in combination with the fact that more directly physical healthcare roles are likely to be associated with greater benefit, suggests that the companionship role should only be secondary. This may reflect the status quo – Sharkey suggests that some social care robots 'are also intended to double as companions' [22]. Hence, it is not unusual for robots' companion role to be secondary to care- and safety-related tasks such as monitoring.

Our participants appeared to show some support for the notion of the robot as an extension of the healthcare team, such that monitoring would be permissible. This view was most prominent in the older people groups:

> *I mean the scenario I could see would be like the virtual doctor, the virtual nurse using the robot as more like a telephone... the robot's telephoned by the professional and it comes through on the i- the Pad and they say, 'Alright George, can I speak to you now? I'd like you to take your blood pressure, or your temperature, or how are you getting on with the new pills' or whatever like that, and then record that and say, 'I've recorded that and I'm handing it, I'm putting it in your notes and handing it on to the doctor' whatever the appropriate thing is* (UB OP2 P6)

> *That's a good use for a robot I think, a very good use. As an alarm, a monitoring device.* (UB OP3 P2)

Others in the OP groups, however, were uncomfortable with this kind of monitoring, describing it as '*unethical*' (UB OP1 P5), and '*Big Brother-ish*' (UB OP2 P1).[4] Nevertheless, the OP groups were the most amenable to using the robot in this way, which is a surprising result given that it is they who would be the subjects of any privacy violations.

Our participants tended to switch between different ways of understanding the robot depending on which best bolstered their intuitions about a given scenario [4]. For instance, when considering whether it was acceptable for the robot to behave like a human carer might if an older person was being rude, some participants felt strongly that the robot was a machine, and as such notions of rudeness were not applicable. Draper and Sorell discuss the issue of "rude" treatment of the robot in greater detail, and while they stop short of describing care robots as full-fledged companions, they note that '[t]he demands of co-operation

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[4] Sorell and Draper [29] dispute this understanding of monitoring, however.

[...] are not entirely reasonable to resist in the case of human-care-robot interactions – at least when they belong to an agreed plan of rehabilitation or re-enablement' [30]. Draper and Sorell's argument may therefore lend some support to the idea that robots can confer benefits in a limited companionship role.

A further, complicating issue is that there is some doubt on the actual efficacy of robots being used for companionship roles. Some recent systematic reviews of studies on the efficacy of companion robots [31, 32] cast doubts on the methodological quality of many of the studies. They suggest that the evidence for the effectiveness of companion robots is weak. This may provide further support to the use of robots as monitors, the efficacy of which is more readily apparent. But it is then unclear what robots can provide that is not already available using other forms of assistive technology [4].

The views of participants in the qualitative study therefore offer a somewhat conflicting picture of how the role of the robot should be viewed. The preceding discussion, however, shows that this may be important in determining the balance between using the robot to monitor, and using it as a companion. We have argued, reflecting Sorell and Draper [4], that the safety aspect ought to take priority over the potential companionship element of the robot. The discussion of monitoring in the preceding subsection, however, has considered some ways that this duty can be discharged in a way that presents minimal disruption to the companionship role. A further complication is that different robot users, with various different reasons and motivations for using the robot in the first place, may have a wide variety of different desires and ideas for how the robot should be used. This may speak for a customisable, tailored approach, so that monitoring duties can be programmed into the robot by those using it. This, however, raises the spectre of the issues that were raised in subsection 3.1, as to *who* should be the one in control of programming the robot in this way. Hence there is a tension between designing the robot to be customisable so that it can suit the needs of different older people, and designing it in a non-customisable way so that control over it cannot be taken over by parties that ought not to be in control of it.

3 Limitations

Ideally all of the transcripts would have been translated into English but this was not possible. Of those that were translated, meaning may have been inadvertently altered in translation, though all illustrative quotations were double translated. Standardisation of analysis may have been affected by the fact that transcripts were analysed in different languages. Frequent meetings to discuss translation and coding helped to mitigate this. More information about this study's methodology and potential limitations can be found in Draper et al. [9].

4 Conclusion

This paper has presented data from the qualitative study in light of some of the ethical issues raised by the literature regarding introducing social robots into the homes of older people. The ethical considerations and conclusions reached in this paper do not always track the conclusions in Sorell and Draper's [4] framework directly, but they are generally compatible with them. Our study participants showed sympathy for the interests of older people *and* their carers. It is our contention that the interests carers of older people are under-represented in the literature to date on care robot ethics for older people. Older people's interests are important given the potential vulnerability of older people, and their own views on how their care is organised are significant [4]. Their interests, however, are not necessarily prior to those of their carers. This means that under some circumstances, the interests of carers may take precedence over those of older people. An example of this is legitimate protection of financial interests where informal carers may inherit debt or financial problems from their relatives' 'socially irresponsible' behaviour [33].

The data also shows that some of our study participants, while being aware of the dangers of monitoring in terms of being forceful and intrusive, which may be a violation of autonomy, were amenable to robots being used to monitor older people in certain ways. They gave serious consideration to means of softening monitoring so that it was more acceptable to older people. This seemed to derive from consideration of the older person's safety as a more important concern.

Finally, we considered the role of the social care robot as a companion to older people. This is a concept particularly popular in the literature and potentially complicated by both cultural differences and individual preferences and sensibilities. The temptation is to allow individuals to have control over programming the robot so that they can decide for themselves how to balance the robot's behaviour regarding monitoring and companionship. As some of the participants pointed out, however, this control may leave use of the robot open to abuse by domineering or forceful carers.

These concerns are serious but not insurmountable – they do not speak against the use of care robots, but rather, they speak in favour of extremely careful programming, design, introduction, and use of care robots. In particular, the authors reiterate a point made by Draper et al. [9]. They argue that the terms of the robot's use must be negotiated and agreed in advance. This may help to prevent abuse and misuse of the technology, which may be to the detriment not only of vulnerable older people, but their carers too. If ethical considerations are included in the process from as early as the design of robotic carers, some of these problems may be overcome. Depending on the individual preferences of the users, ethics may influence the design phase in different ways. This could include setting restrictions on how information can be shared, or on what kind of information the robot can gather.

We thereby lend support to van Wynsberghe's claim that 'ethics ought to be included into the design process of [care] robots' [34]. We consider this claim especially pertinent given the fact that 'many different design options are generally available during the development process of a new technology or product' [35]. We also suggest that the use of the robot should reflect the autonomy of patients where possible. Our participants, however, were open to both formal and informal carers limiting autonomy to ensure the safety of older people, especially where protecting safety might secure autonomy in the longer-term. Related to this, we have argued that it best serves the older person's interests if the robot's role as promoting safety is given priority over its role as a companion for older people.

Compliance with Ethical Standards: informed consent was obtained from the study participants where appropriate.

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