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No place like home? Surveillance and what home means in old age

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Abstract

New surveillance technologies like those included in ambient assisted living are being developed to improve the security and safety of ‘at risk’ older people, but ethical questions have been raised about the extent to which they compromise the rights and privacy of the people being monitored. A qualitative study was conducted to understand the ways these novel surveillance technologies would influence their everyday experiences of home. Participants felt new forms of surveillance would influence their sense of security, autonomy, and self-confidence, and would alter perceptions of home. The findings emphasize the need to improve our understanding of how ambient assisted living will affect the lives of those being monitored.

Keywords

Ambient assisted living; Surveillance; Foucault; Autonomy; Independence; Community

> “This inescapable duty to observe oneself: if someone else is observing me, naturally I have to observe myself too; if none observe me, I have to observe myself all the closer”
>
> - Franz Kafka (1976, p. 397)

Introduction

New surveillance technologies like those featured in ambient assisted living are being promoted as a means to improve the health, safety, and social participation of older adults (Augusto et al., 2012). Ambient assisted living (AAL) utilizes body worn and passive environmental sensors, smart interfaces, and communications networks to provide encouragement and assistance during common activities; automatically detect adverse events

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such as falls or dangerous situations; monitor health status; and track a person's patterns of movement and activity and generate an alert if a variation from the regular pattern is detected (Sixsmith, 2013). These devices vary considerably in terms of their intrusiveness. Devices for facilitating medication administration may provide auditory or visual prompting, whereas camera based activity monitoring and fall detection systems may appear completely passive from the perspective of the resident. One common feature of all of these technologies is that information about device use and sensor activation is automatically communicated to a remote centre for storage and processing. In this way, AAL represents a configuration of potential devices, and monitoring systems, which provide are more continuous data collection and are more impersonal than traditional tele-health interventions. There is growing evidence of the health, social benefits, and cost effectiveness of services like telehealth (Bowles & Baugh, 2007; Pare, Jaana, & Sicotte, 2007), but comparatively little is known about the effects of AAL. Studies exploring the effects of AAL have identified ambivalent reactions among potential users. The technology is seen as beneficial because it could enable them to live longer in the community (Courtney, Demiris, Rantz, & Skubic, 2008; Demiris, Hensel, Skubic, & Rantz, 2008; Wild, Boise, Lundell, & Foucek, 2008). Loss of privacy has been identified as a serious issue, and there are concerns about how it might contribute to stigmatization and loss of autonomy (Milligan, Roberts, & Mort, 2011; Mort, Roberts, Pols, & Domènech Moser, 2013). However, few studies have explored how this type of surveillance might affect users more broadly, especially in terms of its impact on the everyday lives of older people. Therefore, we conducted a study to explore, from the perspective of potential users, the following questions:

- **i.** How would surveillance technologies change the way older people experience the home environment?
- **ii.** How would surveillance technologies influence the person's behaviour and activities?
- **iii.** How would the power relationships inherent in social/caring relationships be affected by surveillance technologies?

Theoretical Background

Most research in this area has focused on issues of privacy with little regard around issues such as autonomy, obtrusiveness, stigma, human contact, individual approach, affordability, and safety (Zwijsen, Niemeijer, & Hertogh 2011). To explore this topic more holistically, in this paper we bring together theoretical ideas relating to: a) home as a meaningful place; and b) surveillance, specifically Foucault's conceptualization of power and governmentality. The core of this theoretical discussion is how technologies of surveillance could impact on the meaning and experience of the intimate space of the home.

Meaning of Home

Elder care services have emphasized the concept of aging-in-place as the preferred option of older people who need support (Sixsmith & Sixsmith, 2008), as well as being seen as the most cost-effective solution to increasing demands for services. Helping older people to remain living at home is thought to contribute to continued well-being, independence, social

participation, and healthy aging. The home is the major environmental focus for many older people, especially those who have become frail or socially isolated (Gitlin, 2003; Sixsmith, 1990).

However, the home is not simply a physical space, constructed of bricks and mortar, but also represents a multi-layered and meaningful 'place' (Sixsmith, 1990; Wahl & Oswald, 2010). This meaningful space is built on the foundations of its physical structure characterized in terms of three key dialectics (Korosec-Serfaty, 1984): inside/outside, visible/invisible, and self/others. The interior is defined as separate from the exterior by some kind of boundary that may be physical or symbolic. For example, a fence is a physical barrier between spaces and is also a figurative marker separating places. The idea of the 'home' suggests a refuge based on the concealment that comes from the physical and symbolic enclosure of the dwelling space. The affordance of 'inside-ness' defines the home as a place of shelter and safety, while 'outside-ness' suggests potential dangers and exposure to the elements. Seaman (1993) sees the inside-ness of the house as important for regeneration, rest, and 'at-ease-ness,' a physical place of retreat from the stresses and demands of the world outside.

The wall of a house is a tangible, opaque boundary between inside and outside, which is often perforated with windows, and this attribute gives rise to a second dimension: visibility. The dweller can still choose to be visible or invisible inside the home, for example, by inviting others in or by opening and closing blinds, and curtains over windows. In parallel to this inside/outside dialectic, there is a tension between the invisible and the visible, the secret and the known.

This choice is itself based on a third affordance of control over the inside space of the home. The inside is the domain of the dweller, while the outside is the domain of others, the dweller having control over how the space is organized, and entry is regulated via physical means (e.g. doors, locks, and keys) and formal and informal privileges of access (legal rights and social practices). In this sense, the home is the place of the personal self, in contrast to the social self of the outside world. Within this personal space it is anticipated that the dweller is able to live autonomously and behave in whatever manner they see fit, free from the restraints and expectations found in the outside world. This aspect of the home marks it as a fundamentally different place to community spaces, where one's actions are also public performances. The control that the dweller has over the home allows it to be used in ways that are personally defined. This control has both symbolic and material implications. For example, the home can be seen as a material resource that the older person can actively use to help maintain function, negotiate autonomy, and sustain a sense of self-identity in the face of declining health (Dovey, 1985).

Meanings associated with in-home care can be understood from the alternative perspectives of both older people and their formal and informal caregivers (Sixsmith, 1990). In this context, the home may be an important power-base through which older people can resist the influence and dominance of formal and informal caregivers. By exercising power to exclude care workers from the home, or from particular parts of it or at particular times, the older person can maintain and legitimize their control over their intimate spaces and their lives more generally than would be the case in other (e.g., institutional) settings.

The meaning of home may vary considerably based on variety of factors including age, sex, ability, presence of cohabitants and need for care. For some older adults, especially women, it may be a site of historic or current abuse, which may contest the notion of the home as a place of refuge (Mallet, 2004). For those with long-term health problems, the home may also become a site of caregiving and receiving, which may erode the boundaries between private and public space (Dyck, Kontos, Angus, & McKeever, 2005).

Surveillance

Surveillance is frequently described as a means of controlling the behaviour of 'others,' as those who watch are in positions of authority over those who are observed. Although Powell (2013) had suggested that "inspection minus intervention equals surveillance" (p.1), surveillance is frequently used to prevent negative outcomes, especially in a medical context (Wilken et al., 2012). Historically, the extent of surveillance was necessarily limited by the available technology and the logistics of face-to-face observation. To overcome this problem, in the late eighteenth century, Bentham (1995) proposed the creation of an ideal institutional setting (the Panopticon), in which individuals (e.g., inmates, patients, residents, students, etc.), could potentially be observed from a central location, but these individuals would be unable to tell if they were being watched. Foucault extended this metaphor to describe how the constant presence of external surveillance could subtly alter the behaviour and thinking of those being observed (Foucault, 1977). New surveillance technologies extend the possibility of surveillance beyond public and semi-private (e.g. nursing homes) spaces into the intimate space of the home.

Those who are observed expect to have the normality of their behaviour judged in a manner, which is akin to the 'medical gaze' of physicians that is used to objectify patients on the basis of the signs and symptoms they display (Foucault, 1973). In reaction to the threat of potential observation, it is anticipated that they will alter their activities. On the one hand, they may adopt behaviours that are socially sanctioned. In this case, these 'self-disciplinary' practices may produce 'docile bodies' which may be "subjected, used, transformed, and improved" (Foucault, 1977, p.136). On the other hand, they may adopt behaviours that undermine these normative expectations, for as Foucault has also noted, "where there is power, there is resistance" (Foucault, 1978, p. 95).

While power has traditionally been understood as the objective control that one group or individual exerts over another, more recent conceptualizations of power have explored how power operates in all parts and levels of the social milieu, including everyday social interactions. Foucault (1980) viewed power as a relationship that is "localised, diffused and typically disguised through the social system, operating at a micro, local, and covert level through sets of specific practices" (p. xi). Power is not a thing that is acquired, but rather exists in its exercise. Thus, power relations are not separate from other relations but are contained within them (Foucault, 1978).

For Foucault, power tends to be productive rather than repressive and is constituted through various mechanisms including discourse, surveillance, and governmentality. Discourses are explanations that, although neither true nor false, create 'effects of truth' that influence how the world is understood (Foucault, 1980). These discourses, which frequently reproduce

older age as a time of dependency, facilitate the construction of certain social realities and make other realities less possible. For example, the discourse of independence emphasizes the importance of maintaining one's self-sufficiency, despite age-related changes in function. The importance of independence is not unexpected, as Western societies preferentially enable those who can function independently, for example, through the implementation of health care policies that tightly restrict homecare services for those who have functional difficulties or not funding wheelchairs for mobility outside the home (Aetna, 2015), but providing considerable infrastructure to enable travel of typically more able-bodied and affluent drivers of private cars (Wendell, 1996).

Governmentality is a neologism Foucault (1977) used to explain the interconnected relationship among sovereignty, discipline, and government. It represents the configuration of strategies and approaches through which various authorities attempt to modify the conduct of individuals to attain state-sanctioned outcomes, such as independence (Rose, 1997). These strategies include technologies of self (e.g. self-regulation, self-discipline, self-surveillance) and technologies of domination (e.g. institutional and social structures and ubiquitous surveillance) (Foucault, 1988). Given that governmentality acknowledges the reciprocal relationship between individuals and governments, it suggests the actions of individuals are neither completely autonomous nor predetermined (Lemke, 2002). Percival and Hanson (2006) proposed that some forms of telehealth could be conceived of as a technology of domination, which contributes to the suppression of those being observed. As such, it may be seen to have a coercive element in that older adults may feel obliged to submit to these technologies to manage perceived risk in order to remain in their own homes. The term extitution (Domènech & Tirado, 1997) has been used to describe how institutional forms of control can be enacted through programmes and processes that occur outside of rigid institutional confines, within more flexible settings like the home; in "extitutions there is no discipline, there are no buildings to enclose, there are no specific moulds to produce subjects" --- instead control is exercise in "the open air." In contrast, Verbeek (2009) has proposed that technology does not determine human behaviour, but rather creates the opportunity for alternative forms of autonomy, which may be distributed between individuals and technological artefacts, i.e., smart refrigerators may eventual suggest menus based on their content and past preferences of users. In this regard, a shared autonomy between device users and technologies could be envisioned that provides a sense of empowerment in the same way that Smartphones are seen to enable those who depend on them (Suki & Suki, 2013).

In summary, the preceding theoretical discussion about home and surveillance indicates it is necessary to go beyond vague notions of privacy to explore how the introduction of AAL could potentially undermine the basic affordances of the home. These theoretical ideas thus provided a platform for our empirical study about how emerging surveillance technologies might impact on the everyday lives of older people living at home.

Methods

We undertook a qualitative study to explore participants' perceptions of home, impressions of a home based surveillance system under development, and interpretations about how this

system would affect their sense of home. Semi-structured interviews were the primary method of data collection, eliciting participants' thoughts and opinions after viewing a video that presented a dramatized scenario showing an older person using an AAL system. The local university ethics boards approved the study design.

Sampling, Recruitment, and Participants

The data were collected between May and September of 2010. A convenience sample was recruited via notices sent to local community organizations in Vancouver, British Columbia and San Francisco, California. Additional participants were recruited using snowball sampling where participants who had completed the study referred others to participate (Bryman & Teevan, 2005).

To be included in the study, participants needed to be 60 years or over and have one self-reported chronic condition or mobility restriction. A self-reported chronic condition was operationalized in accordance with the Canadian Community Health Survey (Gilmour & Park, 2003) where participants self-reported one of 20 chronic conditions, including but not limited to: arthritis; heart disease; asthma; diabetes; bronchitis; cancer; and effects of a stroke. A mobility restriction was operationalized as use of a cane, wheelchair, walker, or scooter to assist with mobilization.

As described in Table 1, 27 individuals participated in in-depth interviews. A majority were female, and almost half relied on an assistive device for mobility. Most rated their health as either good or very good. Less than one-quarter of the participants had experienced a fall in the home. One of these falls was serious enough to result in broken bones, and two participants reported falling in the evening and having to remain on the floor overnight until help arrived. Most participants experienced pain on a regular basis. Almost half reported being hospitalized in the year prior to this study.

Procedures

Written informed consent was obtained for all participants prior to data collection. The audiotaped, semi-structured interviews lasted between 45–75 minutes in length. Interviews were conducted in the participants' homes. The interviews began with open-ended questions regarding participants' perceptions of the meaning of home, in regards to its physical, social, and personal space. Participants then viewed an industry developed, 8-minute film that depicted the following potentially beneficial features of an AAL system: medication reminding, vital signs monitoring, in-home monitoring of falls and activities of daily living via sensor technologies, caregivers access to participant data, information being transferred to an electronic health record, cognitive function monitoring by way of an assessment tool embedded in an on-line game, and social interaction with an online community of friends [http://www.leadingage.org/Imagine-the-Future-of-Aging.aspx]. Prior to watching the film, participants were advised about the source of the film, which emphasized positive aspects of AAL (e.g., how the technologies would assist the films protagonist and his family), and it was emphasized that the researchers had no role in its creation or any financial interest in any of the technologies depicted. Upon completion of the film, participants were asked to describe their thoughts and feelings, and the potential effect that AAL may have upon them

and how it might change the meaning of their home environments. During the interviews, scratch notes were recorded to document emerging ideas and to serve as a tool for reflection (Bryman & Teevan, 2005).

Data Analysis

Interviews were transcribed verbatim and analyzed in NVivo 8 (QSR International, 2009). Analysis of data was on-going throughout the data collection period. Themes and key concepts that were emerging from the data were used to guide the subsequent interviews (Creswell, 2003). The coding of data was completed through a line-by-line analysis of the interviews and items were created to represent salient themes (Bryman & Teevan, 2005). Data collection continued until a point of theoretical saturation, where new interviews were found to add very little to the themes that had emerged from the analysis. Pseudonyms are used in the presentation of all data derived from this study.

Results

Our analysis revealed three main themes: a) “safe and sound” described how participants felt AAL could contribute to their sense of security, b) “reliance” explored how AAL would affect residents’ autonomy, self-confidence, and relationship with caregivers, and c) “under the microscope” revealed how AAL mediated surveillance might alter perceptions of home and activity participation.

Safe and Sound

All participants had a strong desire to continue living at home. The decision to remain at home was frequently contrasted with an aversion to admission into residential care, “The vast majority … of people would prefer to stay at home and [if AAL is] an alternative to going to a nursing home, I’m sure that 99% of people would opt for that” (Mark, a 74-year-old who uses bathroom assistive technology). This finding is in keeping with discourse of aging-in-place, which indicates remaining “at home” is the preferred option of older people who need support (Sixsmith & Sixsmith, 2008),

Seventeen participants described their homes as places of security. Albert (an 88-year-old with four chronic conditions) indicated his home gave him, “A safe feeling. You sort of go back to the old cave, the guy went into the cave, and it protected him from the weather and it protected him from the wildlife, it protected him from invasion.” Almost all participants (n=24) indicated that they felt AAL would make them feel more secure in their homes as was found in small scale trial of AAL (van Hoof et al., 2011). Debra (a 77-year-old with five chronic conditions) indicated the AAL would make users “feel a lot more secure…because when you are experiencing various physical symptoms and live by yourself, it’s easy to get a little bit frightened of incidents happening and not being able to summon assistance.” Fear was, therefore, a motivating factor, which encouraged participants to consider adopting AAL. However, when fear is used as a basis for decision-making, other competing discourses may be silenced (Altheide & Michalowski, 1999).

Three participants were more ambivalent about how AAL would affect their sense of security. “I think there were certain elements that might make me feel safe, there were other elements that would be too invasive” (Meg, a 71-year-old with two chronic health conditions). Olivia (a 95-year-old who uses a walker) expressed concerns about how the system might work in practice. “There might be a false sense of security in that one would think that the [system] was being monitored when really it was being used as a kind of way of reassuring the older person.” Although AAL systems are described as relatively autonomous, issues identified still require human intervention. Therefore, problems with an AAL system could occur because of either technological or personnel-related reasons (Mort, Roberts, Pols, Domènech, & Moser, 2013).

Most participants liked the possibility of fall detection, especially those who had a history of falls.

> Oh, I think that [fall detection] would be a good thing because the fall I had, I haven’t a clue how it happened, I came into the kitchen for something and the next thing I know I’m lying down…on the dining room carpet (Ralph, an 89-year-old with four chronic conditions).

This fear of falling is not surprising given that falls may cause severe injuries, and it provides a compelling reason to accept devices, which might otherwise undermine the sense of security that is usually associated with the home (Dovey, 1985). This automatic fall detection might mitigate some of the issues associated with self-activated alarms that have been described by others (Milligan et al. 2011)..

Four participants suggested AAL technologies had the potential to cause paradoxical effects. In the case of vital signs monitoring, Olivia proclaimed, “I’d worry about the darn thing… it would only increase my blood pressure.” In this instance, rather than provide reassurance, concern about being monitored is anticipated to provoke performance anxiety (Powell, 2004).

For five participants, the thought of using AAL could be demoralizing. “Most older people have a lot of pride and independence and having the comprehensive sensor monitoring would be insulting, and intrusive… the constant monitoring would be really depressing; it would remind me that I have a really serious problem” (Marla). This kind of reaction indicates how AAL provision could be part of a “dividing practice” (Foucault, 1982, p. 777) that contributes to the social production of difference. By labelling those in need of AAL as ‘other,’ in contrast to those who are considered normal, stigmatization, and discrimination can be justified, and social order can be maintained (Parker & Aggleton, 2003).

Reliance

Participants highly valued the sense of self-reliance that they associated with their homes (identified spontaneously by 19 of 27 participants). For Elizabeth (a 75-year-old with four chronic conditions) this meant, “I feel free and…I am still able to do the things [that] need to be done and the things I want to do.” This sentiment is in keeping with descriptions of the home as a place of autonomy (Sixsmith, 1990).

Four participants raised concerns about how AAL might affect their sense of self-reliance whereas the remainder did not. On the one hand, George (a 75-year-old with three chronic conditions) asserted, "[AAL] would make you feel more independent because you know that you can do the things you always did, and you know that if anything happens someone is looking after you." In this regard, AAL could be perceived as a means of empowerment (Milligan, Roberts & Mort, 2011). On the other hand, Beth (a 78-year-old who uses bathroom assistive technology) indicated, "It would probably change the way I feel about my sense of independence…You have these people…watch(ing) you, and that might make you feel less independent." So, for this participant, paradoxically, a technology that was supposed to increase her self-reliance and self-confidence could have the opposite effect. Such a finding is particularly disconcerting given some evidence that self-efficacy predicts declines in function independently of changes in ability (Seeman et al., 1999).

Almost all participants felt that medication reminders would be beneficial for those with memory problems. "Well I think that that's a really good device because it's easy to forget or even double dose if your memory is failing" (Debra). Most participants were unconcerned that the system might be set up to contact an informal caregiver, if a dose was missed, "It wouldn't bother me at all, [if my daughter called to say I had forgotten to take my medication], no I think I'd be thankful for it" (Elizabeth). In contrast, Bob (a 63-year-old with cancer in remission) described his hesitancy with the medication reminding system. "It depends on how often it happens…it depends on the individual. Some people might feel… threatened by it." This fear is understandable, given how those who are deemed incompetent may be treated (Corner & Bond, 2006).

Participants varied in terms of how they felt AAL would affect their reliance on caregivers. Many participants felt that AAL would be beneficial for families and other caregivers. "It just relieves the pressure, and the stress, [about not knowing] what's going on, they think they are doing the right thing, they have proof of it…they don't worry about it, certainly much less stress for the family" (Alex, a 66-year-old with cancer). In contrast, Bob was concerned that AAL would make him feel like more of a burden. "I wouldn't want anything [where] people had to spend their lives devoted to checking on me all the time." Meg raised concerns that the system would be too demanding for caregivers. "Well I don't know if the family needs to be involved in that because they don't have the knowledge to make [an] interpretation." Given the assistance provided by informal caregivers, it is reasonable that care recipients would like to decrease demands on them; however, it should also be noted that informal caregivers' unpaid assistance may come at a cost to care recipients in terms of perceived indebtedness.

Six participants raised questions about which caregivers would have access to the AAL data, i.e., the privacy of their personal information. "I think there are some people in my family I would never give that permission to, and to others I would say please look" (Teresa, a 61-year-old who uses a cane). Some were concerned how caregivers could use AAL as a technology of domination to gain control over the person being observed.

> If an incident happened and the family had wanted to gain more control over their father's finances, they could use the data to display that his cognitive function is declining. So it's time for us to step in there and handle all his finances. (Debra).

This hesitancy is in keeping with research that demonstrates clients are most concerned with disclosure of telehealth data to family members (Tracy et al., 2004), perhaps because of a concern with the power that informal caregivers may exercise (Schiamberg & Gans, 2000).

Two participants also raised a question about whether AAL could contribute to experiences of loneliness.

> Sometimes older people are really lonely and so in a society where resources are not available or limited, I think that people could be left on their own under the watchful eye of the device rather than receiving personal contact (Debra).

In this regard, AAL may allow fewer caregivers to monitor increasing numbers of clients, and it may also contribute to an increased sense of alienation among users, which has previously been described with the implementation of telecare (Roberts & Mort, 2009).

Under the Microscope

Most participants valued their homes because of the sense of privacy they provided. Eighteen of the participants indicated that they were worried that AAL might reduce their sense of privacy. Colleen (an 88-year-old with bilateral hip replacements) asserted, "I wouldn't want to be watched going in and out of the bathroom. That would be…encroaching on [my] privacy." So in this regard, privacy was not just about disclosure of personal information, but was also related participants' sense of dignity. Seven of the participants equated AAL with an unpleasant sense of being watched. "It would make you feel less comfortable…knowing someone was watching… the feeling of being watched would make me feel less relaxed, it's like somebody going through your garbage" (Marla, a 60-year-old with five chronic conditions). Debra suggested that AAL could transform her sense of home, "It would be…like living in a nursing home in your own home." In this example, privacy was also seen to include notions of freedom. In this way, AAL could be considered as a Panopticon, by some participants, undermining the choice of in/visibility and making the home into an extitutional space, which destabilizes notions of inside and outside (Domènec & Tirado, 1997). Most participants indicated they were willing to trade personal privacy for the potential to remain at home. "If [AAL] meant being able to stay…home longer, then privacy would go out the door" (Sarah, a 78-year-old who uses a cane or walker). The potential to coerce people into accepting AAL was illustrated by Donna (a 62-year-old with two chronic conditions, indicated). "I think AAL could feel invasive, however, I think if you got to be at home instead of being in a nursing home or assisted living […] I think that you would welcome it, if it was your choice of being home." Others have reported a willingness to exchange privacy for safety (Wild et al., 2008), but there is a question about to what extent participants believed AAL might affect other aspects of the home, beyond the loss of control over personal information. Liza (a 72-year-old who uses a walker) indicated:

> I'm not sure I'd like my family to know when I take a bath or if I take a bath, it's something of an invasion of privacy, but I can see how…if you were unconscious, and [you needed help], I could see how it's a good thing.

It is understandable that some people may feel compelled to accept this surveillance technology to prevent being considered 'at risk,' a discursive label that might precipitate facility placement. In this regard, AAL offers caregivers a new form of power/knowledge, which can contribute to the objectification of those who are observed. However, it should be noted that informal and formal caregivers may experience AAL differently, as it may place additional demands on informal caregivers who may be the first responders when an alert is activated.

Three participants indicated that they would behave differently with AAL. Alex argued:

> I am positive that [AAL] would [affect how I acted] because I would have to dress up for all occasions [because of the possibility of videoconferencing], I couldn't just walk dishevelled and unshaven, because I would be watched, so it changes your behaviour a lot.

Three participants were concerned about the activity monitoring that the system would perform, "If you don't have a bath every day, who the bloody hell cares?" (Bob). Thus, the introduction of AAL could potentially cause increased inhibitions and decreased spontaneity.

Monitoring cognitive performance using an on-line game was the most contentious AAL technology for participants. Mark stated:

> [If people said,] you know, I don't think you're doing well on your crossword puzzles, I think we have to monitor you every day on your crossword puzzles…I think I might start getting very self-conscious; it could probably set up some blocks [that would lead to a loss of enjoyment of the activity].

Alex felt similar about embedded physical monitoring.

> If solitaire…becomes a test of dexterity, well I would drop doing solitaire because I would feel like I am being examined every day…where's the pleasure in that? No, I wouldn't like that performance stress. It would be there all the time. It is better to leave people on their own to play games, and really play games, not use it as testing.

The cognitive monitoring was different from the other surveillance technologies in that it is less about identifying immediate safety concerns and also more covert. In this regard, most participants seemed less accepting of activity monitoring elements of AAL, which might engender greater self-surveillance and could contribute to the medicalization of the home.

Some concerns were raised that sharing of information that was previously private might negatively impact self-esteem. For example, Albert indicated AAL would make him feel:

> I'm no longer capable of going to the bathroom without being checked. I can't have a bath, if I choose not to have a bath, or I choose not to eat lunch, you know I am

> being watched at that point. I'd begin to wonder maybe I don't belong here, I'm incapable. I think it would be 'really really devastating' to some people's self-worth to be that monitored if it weren't necessary.

In contrast, Donna indicated AAL might motivate some people to make health changes. "Well, it's kind of like Weight Watchers [a supervised weight loss program], because people are watching you, you watch your weight, and if they're not watching, then you don't watch your weight" In this way, AAL could be used not only to monitor safety, but also to encourage self-surveillance. She later added, "As you get older…you lose a great deal of your privacy" suggesting that AAL needed to be seen in the context of other personal care services and surveillance already in place.

Similarly, many participants indicated they were not as concerned with AAL surveillance because they were already being monitored.

> Well, my neighbour across the road and I have this thing with the blinds, if my blind isn't up by 10 o' clock [in the morning], she will either phone or come over and see if I'm alright, we have each other's keys, and she is a diabetic, so if she's not up by 10 o'clock I check on her (Sarah).

This example illustrates an informal, reciprocal kind of monitoring. However, the adoption of AAL represents a shift to a more care industry-based form of surveillance.

Interestingly, Alex suggested that someone being observed could purposefully trick the system. "You could press the button, and the shower goes on, and you don't even take the shower, or you open the refrigerator and you don't eat anything…you could fake it, you could play games with [the system]." Thus, rather than being completely dominated by this technology of surveillance, its introduction also creates space for novel forms of resistance (Milligan, Roberts & Mort, 2011).

Conclusions

Much of the research effort within the area of technology and aging has been focused on developing practical solutions to the needs of older adults. While this aims to help them live independently and enhance their quality of life, the approach has generally adopted an agenda of dependence, focusing on issues of impairment, age-related-decline and the problems associated with later life. This perspective defines older people as passive recipients of care to meet specific health and social care needs, but largely fails to address the very diverse experiences of older people and the way forces within society shape the experience of old age. 'Aging' and 'old age' are largely socially-mediated phenomena (Phillipson, 1998) and information and communications technologies, such as surveillance technologies, are part of this new social context within which the experience of aging is played-out. This is not simply a matter of how technology might be used to help with a specific problem in life, but more crucially how it contributes to the way society works and specifically how technology impacts on the experience of aging both at the level of individual life experience and at the level of macro social processes and relations. In other words, how problems are socially constructed. To prevent AAL from producing and reproducing new dividing practices, requires a more theoretically-driven understanding of

surveillance technologies and their role in the construction of the relationships between caregiver and client/patient, observer and observed.

Our study indicated that AAL technology was generally seen in a positive light. Most participants in our study believed that home-based surveillance could contribute to their sense of security and enable them to stay at home longer, in essence, embracing the shared autonomy between individual and technology, that Verbeek describes (2009). In this sense, surveillance may add to the sense of protection and at-ease-ness that is a fundamental attribute of the experience of home. Thus, depending on how AAL is implemented it may have the potential to empower residents who adopt it, especially if users are given control over who has access to their sensor data, how alerts are triggered and what responses are provided. Indeed, for those people who are concerned about health and social isolation, the home may itself be experienced as a place of fear and vulnerability and having the additional support of AAL technology becomes something they accept into intimate spaces. While they did mention how surveillance might affect their privacy and daily activities, participants were willing to make these trade-offs in the hope of avoiding nursing home placement. Although much of the discussion around privacy issues has been around data security and disclosure, participants emphasized how issues of privacy were also related to dignity and personal freedom.

Due to the limited amount of assistance that is provided in the community, some individuals may be faced with institutional care as their only option. Thus, the policies and practices that determine the funding for homecare and quality of these residential care facilities are in essence technologies of domination (Foucault, 1988), which may coerce some individuals to accept AAL as a less intrusive alternative. Accepting these contextual constraints as natural fails to interrogate how dependence is socially constructed as a problem, because of the limited services that are available, and how independence is actually enabled with the assistance of others. Ultimately, this contributes to a sense that as long as the desired result of remaining at home is obtained, the means become a secondary consideration.

It is also important to consider whether people are fully aware of the tangible effects of introducing AAL into their homes. AAL represents an ideal means of managing risk, which is a hallmark of what Beck (2006) describes as the second modernity, a shift from an industrial civilization to a complex, uncertain, and reflexive information-based society. AAL is not only able to identify risk, but is also a means of predicting and treating it through self-surveillance and regulation, a convenient solution to the potential problems it identifies. In this way, it contributes to the hegemony of risk management, which is used to supersede and silence other competing discourses. As a novel technological product, AAL provides the opportunity to shift risk onto “self-governing consumer-citizens” (Scott, 2007, p. 23), individuals who might otherwise be considered at-risk. In this regard, AAL represents an ideal means of facilitating ‘individualized institutionalization,’ normalizing diversity to such an extent, that radical inequalities may be supported as part of a neo-liberal agenda (Beck, 2007). In the future, it is conceivable that at-risk residents may need to pay for AAL to allow them to stay in their own homes, in essence, paying for their own extitutionalization at home.

AAL increases the permeability of the home by extending the power of observation into what was previously regarded as an intimate, private space. As noted by participants, AAL has the potential to be intrusive, subjecting residents to the gaze of others and making them feel watched. AAL may also be invasive, indirectly leading to changes in behaviour by being observed, or directly as a response to information and feedback as well as encouragement and interventions by the technology and/or service providers. For this reason, AAL has the potential to transform the social dynamic, nature, and experience of the home. Even though potential users were accepting of AAL, the intrusion of the 'clinical gaze' inevitably changes the power relationships between observer and observed. AAL represents a novel means for others (e.g. formal and informal caregivers and health authorities) to gain additional power/knowledge over those who are observed. Within this extitution, the hiddenness of the intimate space becomes exposed, with regulatory effect on the actions of the person being observed and on the actions of the observer/caregiver shaped by the new categories of knowledge afforded by the surveillance system.

Like a genie released from its bottle, knowledge that is created cannot be uncreated. Data produced by AAL, once codified and entered into residents' medical records, can take on a life of its own (Smith, 1990). At the same time, the advent of AAL creates the possibility for novel forms of resistance and autonomy, as illustrated by participants in our study. By controlling sensor data, they could, in essence, contribute to the editing of their virtual presence, indirectly altering how they are perceived by the system, and ultimately by their caregivers, in a manner akin to how people (re)present themselves through social media.

Strengths and Limitations

One limitation of the study is that it is difficult to envisage the effects of the introduction of any new technology, especially the unintended ones (Rogers, 1995). Allowing participants to view a video that vividly illustrated various AAL technologies was a helpful way to help them envisage what it might look like; however, its positive portrayal may have skewed some participant responses. Drawing from participants from two different countries represents a strength of the study, as it contributes to the transferability of the results; however, participants with poorer self-reported health were less well represented.

Drawing on theories of home, Foucault's ideas about surveillance, discourse, and governmentality provided an insightful theoretical lens to use when considering this data. Many of the things that homes enable are premised on notions of the resident as an autonomous subject. Foucault's contributions are helpful at deconstructing this portrayal of residents. This paper also extends Foucault's work by suggesting that dividing practices in the second modernity may contribute to sub-group discrimination while simultaneously limiting collectivization by valorizing individualization. However, further research is needed to provide a better understanding of how expectations about and experiences with AAL, may vary with respect to intersections of sex, race, ability, and age. Additional research could also explore the perceptions of informal caregivers, who will likely need to provide new forms of supervision with the advent of this technology (Milligan, Roberts & Mort, 2001). Rather than explore issues around system utility and efficacy, future studies could also

examine how residents' perception of home are effected by the introduction of functioning AAL systems, especially in terms of perceptions of surveillance.

Ultimately, the development of AAL raises questions about how this technology will affect users and their caregivers. This study emphasizes the need to better understand how AAL will affect the lives of residents being monitored and those around them before this technology becomes a pervasive aspect of the home environment. This is critical, so that strategies can be implemented to prevent AAL from becoming an instrument of oppression rather than a technology of empowerment.

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Table 1

Participant Demographic Information

Variable	N(%) or Mean(range)
Age (years)	77 (60–95)
Female	17(63%)
San Francisco area resident	15(56%)
Number of chronic conditions	4
Mobility device use	12(48%)
Self-reported health	
Excellent	4(15%)
Very Good	7(26%)
Good	11(41%)
Fair	4(15%)
Poor	1(4%)
Falls at home	5(19%
Regular pain	21(78%)
Pain severity	
Very mild	4(15%)
Mild pain	9(33%)
Moderate pain	6(22%)
Severe pain	2(7%)
Hospitalization in last year	12(44.4%)
Length of stay (days)	8 (0–60)