Adult Children's Perceptions of Intelligent Home Systems in the Care of Elderly Parents

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ABSTRACT

Smart home technologies and services are widely researched and being commercialized for use in the homes of older adults throughout the world. However, widespread adoption by older adults of even the most affordable and simple systems has been mixed. While older adults may be the "users" of such technologies, we seek to understand the perceptions held by key "influencers" in the buy and use decisions – the adult child. We present an exploratory study based upon a convenience sample of adult children most likely to embrace intelligent home systems and services. Survey respondents are highly educated, technology savvy, middle to high-income adult children ages 35 and older. This group represents possible "lead adopters" that might advance the commercialization of these potentially useful technologies. Findings suggest that trust in the accuracy of the system, privacy concerns and willingness to intervene in a parent's home may present challenges to adoption even among tech-savvy adult children.

General Terms

Management, Design, Economics, Human Factors, Legal Aspects

Keywords

aging, innovation, smart houses, ambient intelligence, caregiving, assistive technology, home services, caregiving, technology adoption, baby boomers

1. INTRODUCTION

The use of information technology in the home and other settings to support the independence, well-being, and care of older adults has received considerable attention and optimistic forecasts for its demand worldwide. These technologies, and related services, seek to integrate smart technology and other applications of ambient intelligence to monitor, manage, and motivate older adult behaviors and assist

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caregivers in achieving optimal health, safety and independence [1].

Research is on-going addressing the technical design and integration of these systems into the home. What is less known, or understood, are the perceptions and decision processes of those who make the decision to use intelligent home services themselves or adult children who may seek to install these technologies into the homes of their parents.

2. OLDER ADULT ATTITUDES TOWARD INTELLIGENT HOME SYSTEMS & SERVICES

Currently available technology provides the capacity to monitor older adult behaviors in the home. From talking toasters, to an explosion of smart devices, Internet connectivity as well as emerging platforms in entertainment and health, it is now possible for us to monitor when a person wakes, how they walk, and what they do in their own home. Technology can be used even to retrospectively check, with the aid of an intelligent, but tattletale toilet, whether the user has adhered to their diet and has maintained the weight prescribed by their physician.

These same technologies and related services can remind the same person to take their medication or to eat foods that aid in the management of one or more chronic diseases. The ubiquitous application of sensors in and outside the home (or on the body) promise to provide the safety and security that many older adults may require to stay in their homes.

The 2008 Healthy@Home Study conducted by the AARP indicated that nearly 60% of adults 65+ would be willing to use technology to support their ability to stay in their own home, e.g., use of an activity monitor [2]. Another Aging-in-Place survey showed that 65% of respondents over 65 years old were willing to consider use of intelligent systems and 54% were willing to consider the adoption of sensors to monitor their health and safety [3]. Clearly, it would seem that any support to stay at home would be desired.

3. ADOPTION OF SMART HOME TECHNOLOGIES

Despite the ready availability of these technologies, and their considerable promise, and the reported willingness of older adults to use them, their adoption in today's homes has been lacking. The translation of countless technological inventions into innovations in people's lives has been remarkably slow. Even the decades old, generally affordable and simple to use personal emergency response systems, or social alarms, have been less than successful in their widespread adoption.

One study indicates that less than 3% of the older adult population in the United States that could benefit from such systems actually uses them. Even in countries such as the United Kingdom, where the systems are heavily subsidized by the National Health Service, adoption rates are little more than 15% of the population that could benefit from such technologies [4].

Research examining older adult perceptions of these technologies suggests that there may be multiple and compounding reasons for slow adoption. These include cost concerns. Other barriers include older adult knowledge that such systems exist, or where to purchase them. Many of these systems are viewed as a possible threat to personal privacy and, in some instances, dignity. In other cases there is a perceived stigma to using a system that symbolizes frailty and what has been lost rather than the independence it supports. Finally, some older users have reported a lack of trust that the system will work when needed or that the information collected will be used judiciously and as promised [5].

Finally, there may be a difference between concern for one's lifelong independence and the belief that it is actually at risk. Clarity's Aging-in-Place survey of adults 65 and older showed that 89% believed that aging-in-place is very important – but only 53% were concerned that they would be unable to do so without assistance, e.g., family support, technology, home services [3].

4. USERS & INFLUENCERS: ROLE OF ADULT CHILDREN IN TECHNOLOGY & SERVICE ADOPTION

While older adults may be the users and direct beneficiaries of intelligent home technologies and services, they are not necessarily the sole decision maker in the purchase of these systems. The incongruity between older adult concern for remaining independent, but confidence that they can manage alone often becomes a family matter. As parents become elderly and frail, their adult children play an increasingly prominent role in advising, decision-making, and caregiving [6].

Both parent and adult child have a shared interest in independence and well-being. However, adult children (mostly middle-aged baby boomers born between 1946-1964) may be more likely to perceive their parents as increasingly frail and will look for strategies that will support them as caregivers as well as help their parents. As a generation, the boomers have experienced the efficacy of technology in the home, workplace and vehicle – its use in eldercare is a logical next step in their life stage as caregivers.

5. METHOD

This paper reports the results of an exploratory survey of the perceptions of adult children to reveal their attitudes toward the potential use of intelligent systems and services in the their parent's homes.

An on-line and paper survey using a convenience sample of 148 adult children, age 35+, was drawn from the metropolitan Boston area. Respondents were recruited through the region's larger employers, accessing employee populations both on-line and through the distribution of paper surveys. Paper surveys were circulated at employer worksites to be completed by employees or family members.

Nearly 70 percent of the respondents were female. It is generally recognized that women are more likely to be caregivers [6]. Women are also overwhelmingly responsible for the majority of health and wellness purchase decisions for both immediate and extended families.

More than 50% of the respondents had a college or graduate degree. 75% of the respondents were employed, and more than 50% had household incomes over $100,000.

The sample is relatively technology-savvy. Nearly 90% report using a cellular or digital telephone and over 65% had high-speed Internet service in their homes. The perceptions of this educated, tech-savvy, higher income group should provide insight into what might be 'adult child lead adopters' of smart technologies in the care of their parents. This survey begins to inform how these 'lifestyle leaders in caregiving' might perceive, and be willing to adopt, intelligent home technologies and services for their parents.

6. FINDINGS

The survey findings are organized to examine the degree of alignment between the concerns articulated by older adults in previous studies and baby boomer adult child caregivers. These include concern for overall wellbeing and maintenance of independence, types of desired services, willingness to use technologies, perceptions of trust as it relates to the efficacy of the technology as well as concerns surrounding privacy.

6.1 Parents' Safety & Health

As anticipated, more than 70% "strongly agreed" or "agreed somewhat" with the statement that *I worry about the safety of my parents.* Health concerns resonated more strongly than safety. Almost 90% of the adult children ("strongly agreed" 51.4%, or "somewhat agreed" 37%) with the statement that they *worry about the health of my parents.*

6.2 What Technology-Enabled Eldercare Home Services Are Useful?

A technology-enabled home services architecture was described to the survey respondents. The description included the capacity to monitor daily activities and provide predictive insights into a future event (e.g., a fall); report food intake and eating habits; facilitate food shopping and kitchen inventory; track medication adherence; and automatically order prescription refills.

	Not Useful	Not too Useful	Somewhat Useful	Very Useful
Activity Monitoring	5.4%	18.9%	51.4%	24.3%
Diet Habits	8.1%	24.3%	43.2%	24.3%
Shopping & Food Inventory	2.8%	13.9%	52.8%	30.6%
Medication Adherence	2.7%	5.4%	18.9%	73.0%
Prescription Refills	0.0	2.7%	27%	70.3%

Figure 1. How useful do you think each type of service would be?

There is clear desire for technology-enabled services to support elders and caregivers. The survey data shows that 67% of respondents were "very or somewhat willing" to use a sensor system in the home of their parents. Only 21% indicated that they were "not at all willing" or only "somewhat unwilling" to adopt the technology. The remaining respondents, nearly 12%, selected "don't know."

Figure 1 shows the system functionalities the respondents found most useful. More than 70% of respondents found systems that support medication adherence and prescription refills to be "very useful." While still positive, only half of respondents viewed services that monitored daily activities such as diet or assistance with food shopping as "somewhat useful."

6.3 Two Faces of Trust

Lee and See [7] define trust as an "attitude that an agent will achieve an individual's goals in a situation characterized by uncertainty and vulnerability." While an older adult may see their home of many decades as a safe haven, an adult child may now view the family house as an extreme environment of hazards, inaccessibility, and isolation contributing to poor

adherence to diet and medication regimens. To resolve this fear, trusted home services and automation must be seen as managing or minimizing this threat. Respondents highlighted two dimensions of trust.

The first dimension addressed the capacity of home technologies to provide accurate and actionable information about the wellbeing and behavior of the residents. More than 36% of respondents "strongly agreed" or "agreed somewhat" with the phrase *a home system...would not provide information that would be accurate enough to be useful*. While an equal proportion (36%) of respondents disagreed or strongly disagreed with the statement – believing such a system was likely to work accurately – nearly 28% neither agreed nor disagreed. The findings suggest that there remains some question as to the technical efficacy of such services to address the fears of the adult child.

The second dimension of trust relates to privacy, protection, and the appropriate sharing of information. Nearly 50% of respondents "strongly agreed" or "agreed somewhat" with the statement: *information like this could not be protected from computer hackers, government, or other companies or individuals I do not believe should have access to it.* Only 31% "disagreed somewhat" or "strongly disagreed" with the statement with almost 20% "neither agreeing or disagreeing." While nearly half of respondents seemed confident or had no opinion, the data suggest that there is considerable intensity and concern around privacy and appropriate data sharing.

Perhaps the most compelling response indicating the challenge privacy and data protection poses to intelligent home services is the response to the statement: *I would never have a system like this installed because I would not want information like this to be collected.* The direction and intensity of the response shows that despite the potential benefits and desire for services, the concern for privacy remains a powerful barrier. More than 22% "strongly agree" while another 25% "agree somewhat." In contrast, nearly 14% "strongly disagreed" and 22% "disagreed." Another 17% "neither agree or disagree" with the statement.

7.0 DISCUSSION

The findings suggest that the desire for assistance and the belief that intelligent home services can support eldercare needs is strong. While services to monitor general well-being are attractive, these findings suggest that support of critical medical needs around medication adherence are perceived as most important.

Despite the desire for these services, this survey of possible lead adopters of home technologies suggests that there remains some apprehension in their practical use. First, trust in the efficacy of the services remains a barrier to adoption. Half of the tech-savvy boomers

responding to this survey have some concern that the system may not be accurate enough to be useful, e.g., false alarms, sensor failures. Unlike consumer electronics, it appears that adult children fully appreciate the need for high system reliability to adequately protect their parents from potentially high-risk conditions and events. Adult children may also be concerned with ensuring that the information provided is accurate and actionable.

Second, protection of privacy remains a significant challenge to adult child adoption. The findings suggest that trust in how the data are collected, protected and used may be a barrier to widespread adoption. Given recent glitches and hacker successes in accessing retail credit card databases this fear may only grow. In addition to technology offerings, the brand of the service provider may be as important as the effectiveness of the technologies and services to be offered. This may present an opportunity for strategic partnerships with trusted affinity groups, e.g., disease associations such as the Alzheimer's Association, American Diabetes Association, to provide home services.

Finally, even this highly technology-savvy, educated and relatively affluent sample of boomer adult children suggests that there is some conflict between the hope for technology services and the trade-off of personal as well as parental privacy. This underlying concern may only exacerbate the natural role strain between being a child – even if now an adult – and intervening in your parent's most personal affairs.

8.0 FUTURE RESEARCH

This research has limitations. By design this exploratory sample was biased to understand the perceptions and attitudes of what might be lead adopters of intelligent home eldercare technologies. Future research should include a larger sample to account for differences in education, income and cultural variations in caregiving roles, e.g., caregiving styles in Hispanic, African American, and Asian households. The data also suggest that parent health and medical adherence were key concerns. Future research should examine the role of health status of parents as a predictor of the willingness of adult children and parents alike to adopt selected technologies and services.

Finally, this work begins to identify the role strain of adult children intervening in the lives and lifestyles of their parents. Future research in the adoption of home technologies may benefit from understanding how family discussions and conflicts are managed in other difficult eldercare domains, e.g., driving cessation, end-of-life planning, etc. While technology applications offer considerable benefit, the 'soft' issues of trust, privacy, and family dynamics may continue to be a barrier to adoption.

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