Attitudes Towards Health Technologies for Telecare and Their Relationship To Successful Aging in a Community-Based Older Minority Population

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Abstract

Purpose: Examined attitudes and practices related to readiness and use of health technologies for telecare among an older minority population residing in affordable housing. **Design and Methods:** A model of successful aging based on Rowe and Kahn is used as a conceptual framework. Eighty-five respondents with an average age of 73 completed a self-administered survey that assessed receptivity to health technologies for telecare. **Results**: The survey showed that this older, predominantly African American community has an interest in health technologies that enables telecare and successful aging in place, irrespective of education and physical functioning levels. Results also suggest that those most likely to adopt new health technologies for telecare have the most positive attitudes toward successful aging, and are currently using some health technologies. The health technology that would be most likely to be used was environmental sensors in the home. Older residents were most open to health technologies for telecare that improve communications with healthcare personnel, especially for medical emergencies and detecting falls. Arthritis, hypertension and diabetes were the top health problems; and getting enough exercise and following a healthy diet were the key barriers to managing them. Use of a camera in the home to monitor illness gave seniors the most concern. **Implications:** Older minority Americans residing in affordable housing are generally receptive to in-home health technologies for telecare.

Background

The US older population has grown rapidly during the 20th century, and although people are now living longer, the incidence of chronic illness is rising in this population, threatening individual quality of life, and placing more demands on the health care system. (Payne, Mowen, and Montoro-Rodriguez 2006, 20) One of the goals identified in Healthy People 2010 is to increase life expectancy and quality of life over the next 10 years by helping individuals gain the knowledge, motivation, and opportunities they need to make informed decisions about their health. Another goal of Healthy People 2010 is to eliminate health disparities among segments of the population, including differences that occur by gender, race or ethnicity, education or income, disability, geographic location, or sexual orientation .(U.S. Dept. of Health and Human Services 2000) . Health disparities refer to differences in health profiles across major subgroups of the population, including a broad spectrum of physical and mental health outcomes, from self-rated health to mortality, from psychological well being to major mental disorders(Schnittker and McLeod 2005). While demographers estimate that the number of African American elders will increase by 102 percent between 1990 and 2020, African Americans continue to have a lower

life expectancy rate than the overall population. According to the National Vital Statistics Reports, African American life expectancy is 70.2 years, compared to an average of 76.5 years for all population groups.(U.S. Dept. of Health and Human Services 2006) The difference in life expectancy is even more striking among African American men, who have a life expectancy of only 66.1 years, compared to the national average of 73.6 years for all men (U.S. Dept. of Health and Human Services 2006)

Several social and economic factors contribute to these disparities. More than 68 percent of older African Americans are poor, marginally poor, or economically vulnerable. Older African Americans are more than one and a half times as likely as white elders to live below the poverty line. More than one in four older African Americans have incomes that fall below the poverty line(U.S. Dept. of Health and Human Services 2006). Many older African American women are vulnerable to social isolation and economic hardship. Nearly 40 percent of African American women ages 65 and older live alone compared to 19 percent of older whites ages 65 and older. African American elders are also less likely to be married compared to white elders. For older African American men, 55 percent are married compared to 75 percent of older white men, and 22 percent of older African American women are married, compared to 42 percent of older white women(U.S. Dept. of Health and Human Services 2006). In terms of health, older African Americans are more likely than whites to suffer from hypertension, diabetes and have serious physical limitations. Heart disease death rates are more than 40 percent higher for African Americans than for whites; for prostate cancer, it more than doubles that for whites. African American women have higher death rates from breast cancer despite having a mammography screening rate that is nearly the same as the rate for white women(U.S. Dept. of Health and Human Services 2000).

Health Technologies has been proposed as one way to help reduce health disparities (Redford and Whitten 1997; Freedman et al. 2006; Williams, Doughty, and Bradley 2000). In many cases the elderly or disabled people who need care or special services are able to live independently due to technology used in such products as motorized wheelchairs. With the growing dependency rate, telecare can ensure that the quality of care does not decline because of any numerical imbalance between generations(Brink 1997).(Tang and Venables 2000) Health technologies for telecare have increased the opportunities to monitor and treat diseases. However, it is important to recognize that a significant proportion of the elderly population has

disabilities that may limit to access to or use of new health technologies.(Fisk 1998) Even though many elderly people hesitate to think of themselves as "disabled", they do experience many functional limitations that are associated with aging. These physical or mental limitations, if ignored, can make it difficult for an individual to make good use of health technology. Additionally, low income older African Americans tend to lag behind when it comes to the use of health technologies, further expanding the digital divide(Brink 1997).

Conceptual framework:

The concept of successful aging (Baltes and Lang 1997) (Kahana and Kahana 2003)suggests that older adults can utilize both cognitive and behavioral factors to optimize their health and adapt/compensate for change brought on by chronic illness in later life. According to Rowe and Kahn (Rowe and Kahn 1997), behavioral or lifestyle factors account for at least half of our health status. Thus despite the common notion that aging is associated with decline, they asserted that older people could modify their behaviors or lifestyles in a way that promotes health and independence, and prevents/delays the deleterious effects of chronic illness and disability(Payne, Mowen, and Montoro-Rodriguez 2006).

Research on successful aging may enrich our understanding of the strengths and competencies that people bring with them or bring to bear in later life. Expectations of older adults about aging have been shown to be associated with beliefs about seeking health care. Drs. Rowe and Kahn pointed out that many of the age-related changes historically regarded as normal aging are preventable; they proposed the model of "successful aging" as an alternative to "usual" aging. Successful aging includes three components: low probability of disease and disease-related disability, high cognitive and physical functional capacity, and active engagement with life. In recent years, a greater percentage of older adults appear to be living up to this model and succeeding at living independently and without disabilities.(Sarkisian, Hays, and Mangione 2002). Thus, clinical programs oriented toward enhancing the health of older adults will benefit from knowledge of older adults' perceptions about aging well, or successfully.

This conceptual framework will be used to examine the relationship between attitudes toward new health technologies and successful aging in the population under study.

Literature Review

Beliefs about Factors That Contribute To Successful Aging

Successful aging can be attributed to a variety of factors, including psychologic, social and physiologic. Sarkisian (Sarkisian, Hays, and Mangione 2002) set out to measure expectations regarding aging among community-dwelling older adults. The sample for this study excluded African Americans. More than 50% of participants felt it was an expected part of aging to become depressed, to become more dependent, to have more aches and pains, to have less ability to have sex and to have less energy. After adjusting for sociodemographic and health characteristics using multivariate regression, older age was independently associated with lower expectations regarding aging. Most older adults in this sample did not expect to achieve the model of successful aging and had low expectations regarding aging which was independently associated with not believing it important to seek health care. Baltes and Lang (Baltes and Lang 1997) examined differential aging in everyday functioning between resource rich and resource poor older adults. They argued that resource-rich people will age more successfully than resource-poor individuals. Seeman, et al (Seeman et al. 2001) studied the relationship between social support and successful aging. They found that levels of emotional support are related to better cognitive functioning in cross-sectional analyses for both men and women. They suggested that socially supportive interactions seem to be an ingredient for successful aging. Few studies examined how older African Americans view the experience of aging successfully(Parker et al. 2002).

Receptivity Toward Health Technologies

The innovations of both high and low technology take time to be adopted in health care as they do in other areas such as acceptance of computers (White 2000) or ATMs(Smither and Braun 1994). Due to the complexity of health care and the rapidity of changes, many of the innovations can be viewed as intimidating, especially by seniors(Redford and Whitten 1997). Successful introduction of health technology requires a detailed understanding of how the proposed innovation is perceived by the users. This is especially true in underserved groups such as minority seniors whose needs, beliefs, and perceived barriers may differ from what is considered “average”. Evidence suggests that acceptance of new technology may differ based on the types of care and how accessible direct care is and is strongly influenced by factors that relate to dwelling design and the ways that independent living is promoted.(Allen and Hays 1995).

Much of what has been published about barriers to the use of health technologies focus on the technology or infrastructure, relationships within the health delivery system, or costs and reimbursements(Needham 1997). Surprisingly little literature exists on the perceived needs/preferences, barriers, and beliefs about health technology from the senior's perspective, especially minority seniors who have lower education, less computer literacy, and more disabilities compared to the general population.

Lessons learned from technology implementation attempts to underscore the importance of using formative research techniques to identify and address barriers(Hagedorn et al. 2006). One example of this approach was a study by Demiris on seniors' views about ways that they thought they could benefit from technology; overall, seniors had positive attitudes toward devices and sensors that can be installed in homes. Concerns were expressed about user friendliness, lack of human response and need for training(Demiris et al. 2004). Another study found that, contrary to earlier work, women were more receptive to technology than men(Zimmer and Chappell 1999). Another important result was that the most important factor in predicting receptivity was the level of concern a person had for problems that could be alleviated through the use of technology. This literature review reflects the lack of studies specifically examining the technology receptivity needs and beliefs of minority seniors.

Perceived Barriers to Managing Chronic Conditions

Much work has been done to identify potential barriers to seniors who are trying to manage various chronic health conditions such as arthritis, hypertension and diabetes. While the type of barriers reported is diverse, some core variables are identified as barriers across populations and diseases. Pratt, for example, found that low knowledge of the disease and its risk factors, low education, perceived stress and limited finances were barriers to stroke prevention in African Americans.(Pratt et al. 2003). For those coping with arthritis, barriers to regular exercise included older age, obesity, poor self-reported health, and physical limitations related to joint symptoms(Fontaine and Haaz 2006).

Although progress has been made over the last 30 years in term of awareness, high blood pressure control remains one of the most important and prevalent challenges for older African Americans(Bone et al. 2000). Among the barriers to managing hypertension are difficulty in changing dietary habits, physical activity levels and tobacco use(Carlsson and Stein 2002). Barriers to exercise have been attributed to patients, caregivers and health care providers,

complicating the challenge of reducing the risk of inactivity(Heath and Stuart 2002). Another important barrier to managing hypertension is consistent medication use, which is complicated by inability to pay out of pocket prescription expenses for those with no or inadequate insurance coverage. Coping techniques include stretching out or stopping medications(Saver et al. 2004).

A community based study found that for hypertension and diabetes a lack of exercise resources and high quality grocery stores to be major barriers to behavior change (Plescia and Groblewski 2004). A study of barriers to diabetes education in African Americans found that concerns about poor vision and reading problems were critical especially among those who were older, disabled, of lower education or male gender(Rhee et al. 2005). Similarly, barriers to effective self-care for diabetes among African American women included finances, chronic pain, and vision problems; also important were reluctance to engage in regular exercise (Schoenberg and Drungle 2001) and blood glucose monitoring(Adams et al. 2003). Surveys of African American women confirm that another important barrier to coping with diabetes is difficulty saying "no" to family which was correlated with key factors such as poor stress coping and negative perceptions of diabetes competence(Samuel-Hodge et al. 2005).

Purpose and Research Questions

The purpose of this pilot study is to describe the knowledge, attitudes and practices about the use of health technologies for telecare in the homes of community dwelling underserved older minority residents in an affordable housing community. It also seeks to explore the relationship between attitudes toward health technologies and successful aging.

The literature and a successful aging model guided the development of the following research questions from the point of view of older minority Americans residing in an affordable housing community:

1) What are the most prevalent chronic conditions reported by residents?
2) What are the most important perceived barriers to managing chronic conditions?
3) Which health technologies are residents currently using?
4) Which health technologies would be used if available and which specific circumstances would be acceptable for use in their homes?
5) What attitudes, health factors or demographic factors help to explain attitudes towards acceptance of new health technologies?

Methods

Setting

The affordable housing complex that was used in the current pilot study was selected because it was equipped with a computer training facility conveniently located in the same building where the participants resided. The housing units in the building were all previously wired through a centralized computer network for high speed internet access. Residents who sign up and obtain the necessary equipment can access the internet either from the computer center or from their apartments via a low cost community intranet.

This pilot study is the first phase of a larger multi-year project that seeks to generate a comprehensive telecare service program utilizing advanced telecommunication and computer/information technologies. The telecare program will be demonstrated in an affordable housing community located in a large, urban metropolitan area, designed to meet the housing and service needs of low and moderate-income individuals, families and the elderly.

Study Instrument

Data for this study come from a self-administered survey which was delivered to each apartment in the resident complex (high rise and garden apartments). The survey instrument was developed by locating items from the literature, the successful aging model and focus groups with a sample of participants. The draft survey items were pre-tested with a group of residents who completed the survey and who engaged in a discussion with the authors on the meaning of key concepts, the meaning of successful aging and health problems they encountered. The final version of the survey is available upon request from the first author.

Study Population

Of the 200 residents, 85 completed the survey, yielding 43% participation. Residents were asked to complete informed consent, the survey and to return it to a box placed in the reception area of the Senior Housing building. A second wave involved additional attempts through face-to-face interviews conducted by a graduate research assistant to facilitate participation by those who did not respond or who needed assistance due to limitations related to literacy, vision, and/or dexterity. Data collection occurred during the first quarter of 2006. The study design and methods was submitted to and approved by the Institutional Review Board (IRB) at the Catholic University of America where one of the Co-Principal Investigators resided.

As shown in Table 1, the average age of the study population was 72.6 and the range was 55 to 106 years. The majority were female (55%) and African American (78.8%) or other

minority group members (7.2%). More than a third (36.5%) did not have a high school diploma and more than half had an annual income of less than $10,000. The majority lived alone (91%) and were either divorced or separated (29%) or widowed (29%). These demographics of study population mirrors the sociodemographic profile of the 200 residents. The overall resident population is 84% African American, has a mean age of 73, is 53% female, with 66% having annual incomes less than $10,000, and 40% having less than a high school diploma.

Measures

The dependent variables were a series of items that measured older residents' attitudes toward acceptance of new health technologies**.** The nine individual items measuring attitudes toward accepting health technologies included questions on calling for medical assistance, helping manage medications, sending health information to my doctor, and allowing a nurse to check on me with a camera when I am sick. Each was scored with a 5-point Likert scale ranging from strongly disagree to strongly agree. A composite measure was created by summing the nine items into the Positive Attitude Toward Use of Technology index. The inter-item reliability using Chronbach's Alpha was .89 suggesting internal consistency of the measure.

Other important variables on use of technology elicited yes-no responses on whether a person had or would use 25 health devices that ranged from low to high technology. The individual items included devices and medical equipment such as oxygen, wheelchairs, ramps, inhalers, jar openers, pill holders and grab bars. The number of devices currently owned by the respondent were counted and summed in an index of the number of Technology Devices Have Now. The number of devices the respondent would use if available was counted summed in an index of the number of Technology Devices Would Use. The inter-item reliability using Chronbach's Alpha was .95 for both indexes suggesting a high degree of internal consistency.

An important independent variable consisted of 12 items on perceived barriers to managing chronic health conditions. The individual items included getting the right amount of exercise, following a good diet, taking the right medications, getting the correct monitoring device and getting testing supplies and medications. Each was scored with a 5-point Likert scale ranging from strongly disagree to strongly agree. A composite measure was created by summing the 12 items into the Perceived Barriers to Manage Chronic Conditions index. The inter-item reliability using Chronbach's Alpha was .96 suggesting high internal consistency of the measure.

Another important independent variable in this study was a series of items designed to measure beliefs about factors that contribute to successful aging. The 11 items, adapted from earlier work by Rowe and Kahn and input from the focus group on what older African Americans thought was the meaning of "successful aging" for them, was scored with a 5-point Likert scale ranging from strongly disagree to strongly agree. A composite measure was created by summing the 11 items into the Positive Attitudes Toward Successful Aging index. The inter-item reliability using Chronbach's Alpha was .93 suggesting high internal consistency of the measure.

Analysis Plan

Descriptive analysis was used to explore the first three research questions. Comparisons of mean dependent variables were used to compare possible demographic differences in research question 4. A regression analysis was used to investigate research question 5. A stepwise model was constructed to investigate attitudes toward new health technologies, as well as the role of demographic factors. The key independent variables were the indexes on successful aging, and use of health technology now. Health status variables such as the number of chronic conditions and the Instrumental Activities of Daily Living (IADL) were used as mediating variables. Key demographic factors such as education, age and gender were also added to the model as mediating variables.

Results

Prevalence of Chronic Conditions

The first research question explores the prevalence of chronic health conditions in the study population. Survey respondents were asked to list all the chronic health conditions that they had. The highest ranked were arthritis (57% and hypertension (55%), followed by diabetes (29%), chronic pain (24%) and asthma (17%).

Perceived Barriers to Use of Health Technologies in the Home

The second research question was what are the most important perceived barriers to managing chronic conditions? Respondents were asked a series of questions on attitudes towards a variety of potential barriers to management of chronic conditions. The top ranked concerns were getting enough exercise, reported by 79.8% followed by maintaining a healthy diet, reported by 71.5%. These barriers are key since they are an important part of recommended

management strategies for a variety of chromic conditions, including the top ranked problems in the study population.

The next most frequently cited barriers for respondents were cost of supplies and medications, taking the right amount of medications, getting answers from a doctor or nurse, and taking pills at the right time, all reported by at least two thirds of respondents. Other barriers reported by at least half of respondents included cleaning a device, knowing what to do with readings, getting the right device, knowing if a device is accurate, using a device, and getting testing supplies, in that order.

Health Technologies Currently in Use

The third research question is what health technologies are already being used by older minority residents? The health technologies that are currently being used and would be used if available are listed in Table 2, ranked by the percent reporting that they would be used if made available to the respondent. Of the health technologies in current use by respondents, low technology devices such as canes, grab bars, pill holders were the most frequently reported, followed by devices to monitor blood pressure (25.9%) and blood glucose (21.2%).

Among the most popular health technologies that would be used if available to residents in this population were environmental sensors (56.5%), followed by pulse monitors, laser surgery, scale, oxygen, wheelchair, ramp, electric door, breathing device, heart monitor, Electrical Cardiogram, and bath strips, all of which would be used by 40 to 50% of respondents. The other devices listed in Table 2 would be used by between 20 and 40% of respondents, if they were made available.

Adopting Health Technologies for Telecare

The fourth research question is which specific situations would be acceptable to respondents for adopting health technologies in the home? As Table 3 shows, respondents were most likely to agree or strongly agree with health technologies that enabled sending health information to their doctor, or that enabled them to call for medical help when needed. Respondents were least likely to agree or strongly agree (68%) that they would accept health technologies that allowed a nurse to check on them with a camera when they were sick. Note that this was the only health technology to receive a significant number responding that they disagreed or were undecided about acceptability. The other health technologies, such as helping to manage medications, monitoring falls, and sending health readings to the doctor, were

acceptable to at least 80% of respondents. Overall, respondents agreed that health technologies related to telecare would be acceptable in a wide variety of special situations. The only exception was camera-related monitoring even while they were sick.

Accepting Health Technologies for Telecare

The fifth research question posed in this study was whether there were demographic differences in current use of or attitudes towards accepting new health technologies. To investigate this question, mean scores for five key variables were compared for three demographic factors, age, gender and education level. Indexes were constructed for the number of health technology devices in use, the number of health technology devices that would be used if available, perceived barriers to managing chronic conditions, positive attitudes toward use of health technology, and positive attitude toward factors related to successful aging. Each index was constructed of multiple survey items and was tested for internal reliability using Chronbach's Alpha. The results of this reliability analysis showed that each index had a high level of internal consistency with Alpha's of 0.89 or higher.

As shown in Table 4, there were few statistically significant differences in the mean scores for most key variables for the three demographic factors. One noteworthy exception was that older seniors (71 or more) reported a higher average number of health technology devices in use now compared to younger seniors. Younger seniors, on the other hand, had higher average scores on the perceived barriers to managing chronic conditions index compared to older seniors. Seniors that were high school graduates had significantly higher scores on the positive attitudes towards aging compared with those with less education. This analysis suggests that except as noted, the use of current and future health technologies for telecare need not be limited within the older adults studied to any particular social or demographic group.

The fifth research question was also explored in more depth using a regression model that included attitudes, health factors and demographic variables to help to explain seniors' attitudes toward new health technologies. The outcome or dependent variable was the Positive Attitudes Toward Health Technologies Index. The independent variables were grouped into four categories and entered into the analysis in a stepwise fashion in the following order: Positive Attitudes Towards Successful Aging, Use of Technology, Health Status, and Demographic Factors. The specific variables that were included in each of these groups of variables are detailed in Table 5 along with their standardized beta coefficients. Overall, the model explained 23% of the variance

in the positive attitudes towards health technology index. The only two variables that were significantly related to positive health technology attitudes were having a positive attitude towards factors associated with successful aging and having health devices now (both $P < .001$). This analysis suggests that those who will be most likely to adopt new health technologies will be seniors who have the most health technologies now in their home and those who have the most positive attitudes towards successful aging. These results held even after controlling for the other possibly confounding factors in the model such as age, education, and health status.

Discussion

The purpose of the pilot study was to explore the role of current beliefs, attitudes and practices around the use of health technologies for telecare of low-income older minorities residing in an inner-city affordable senior housing community. Using a "successful aging" framework based on Rowe and Kahn (Rowe and Kahn 1997)and focus groups with the population under study we designed a survey to examine the relationship among technology beliefs, attitudes and practices, and acceptance of health technologies and successful aging. This exploratory research is the first phase in a larger multi-year project that seeks to demonstrate a comprehensive telecare service program utilizing advanced telecommunication and computer/information technologies in an affordable housing setting.

This research contributes to filling the gap in existing successful aging research by conducting the present study in a minority, predominantly African American population. The research in successful aging has been for the most part on non-minority populations. Results revealed that in general older, low-income residents irrespective of their level of education and physical functioning have an interest in health technologies that can help them to "age in place". Results also suggest that those who will be most likely to adopt new health technologies will be older adults who have the most positive attitudes toward successful aging.

It is interesting to note that the top rated barriers to managing chronic health conditions among lower income older residents in this study were elements of lifestyle, namely, getting enough exercise and following a healthy diet, each cited by at least 70% of respondents. This is important in light of the chronic conditions mentioned as most important by respondents: arthritis, hypertension and diabetes, all of which include regular exercise and diet/weight control as prominent recommendations for self-care to control the condition and increase the effectiveness of medical regimens. Other barriers cited by at least two-thirds of respondents had

more to do with getting desired services from the health care system, such as the cost of supplies and medications, and getting answers to health questions from a doctor or a nurse. Taking the right amount of medications at the right time was another aspect of chronic disease management mentioned by participants. This aspect could benefit both from better patient self-care and from better health education and follow-up from providers.

It was not surprising that the most likely health technologies to be in current use were low-technology devices such as grab bars, canes, and jar openers. It was somewhat surprising that the most likely health technology that would be used if available were environmental sensors in the home, which are used to detect motion related to activities of daily living and send alerts to a monitoring center in case a person appears to need assistance. However, this selection is consistent with respondents' answers about which situations would warrant acceptance of new telecare-related health technologies. The top five-ranked situations were all related to technologies that could improve communications with a doctor or a nurse, especially in time of medical emergency and included devices to send information to a doctor, call for medical help, signal a nurse that " I am OK", and monitoring to detect falls. This important finding suggests that one of the key to introducing new health technologies in this population will be to insure that they include numerous opportunities for the individual to communicate better with their medical providers. It is notable that the one situation that gave respondents the most concern by far was the use of a camera to check "on me when I am sick." This is consistent with previous research (Glueckauf and Ketterson 2004; Redford and Whitten 1997) that finds older adults most reluctant to allow cameras for monitoring in their homes. Perhaps demonstrations that show features that enable the resident to maintain some control over when and how the camera is used would reduce this concern. In addition environmental sensors in the home can be used as a proxy to gather similar information without use of cameras. Other research on older African Americans suggests that many have not forgotten the Tuskegee experiments which still engenders suspicion of medical intrusions in their lives(Brown and Topcu 2003; Freimuth et al. 2001; Lichtenberg et al. 2004).

It was very interesting to learn that there were no significant differences in receptivity toward new health technologies on the basis of age, gender or education differences. This suggests that new health technologies that address the needs of older minority populations will have broad appeal in the situations that are most important to participants.

Limitations

Several potential limitations should be kept in mind that could limit the generalizability of the pilot results. First, the affordable housing building was located in the Washington, DC metropolitan area and may not be representative of older minorities in other parts of the US. Second, the survey was conducted in an affordable housing complex that was one of the early affordable housing communities to be wired for high speed internet access and offers classes for its residents in using the computer and the internet. This environment may have created a climate that led some respondents to answer questions about technology in a socially desirable way. Third, even though the survey for this study was pretested with a group of residents, some of the terms used in the final survey may not have been understood by some respondents with limited literacy skills and/or education. Fourth, this pilot study was not designed to measure attitudes toward technology before and after it was actually made available to residents. We assume that receptivity to health technologies may be different after residents actually see and use it. This research is part of a Telecare Technology Demonstration project funded by the Department of Commerce's Technology Opportunities Program. Subsequent to this exploratory research residents will be exposed to the health technologies and educated about their uses, especially in managing diabetes and hypertension. Longitudinal studies need to be designed to measure actual use of technology once it is introduced to guide design engineering and health education components to better tailor the technology and related telecare support systems to residents needs.

Conclusions

The key findings of this exploratory study were: 1) the most important chronic health conditions included arthritis, hypertension and diabetes in that order; 2) the most important barriers to managing health conditions were getting exercise and following a healthy diet; 3) the most popular health technologies that would be used if available among this population were environmental sensors, pulse monitors, laser surgery, scales and oxygen; 4) the situation in which older residents would accept new health technologies in their homes included ones that enable sending health information to their doctors, call for medical help; 5) the situations in which older residents would be least likely to accept telecare-related health technologies was to use a camera that allowed a nurse to check on them when they were sick; 6) older residents reported a higher average number of health technologies in use now compared to younger

residents; 7) Younger residents had higher scores on perceived barriers to managing health conditions compared to older residents; 8) the two variables that were significantly related to positive attitudes towards health technologies were having a positive attitude about successful aging and having health technologies devices currently in use. These results held after controlling for age, education and health status.

In conclusion, it appears that this study provides some evidence of receptivity of older minorities residing in affordable housing to the introduction of new telecare-related health technologies. This study yielded useful information to facilitate planning for the next stage of the Telecare project which will be to match the available technology with the specific health needs of the resident population. More qualitative and quantitative feedback from this population after they have actually seen and tested some of these technologies would help clarify the best ways to select, introduce and maintain appropriate technologies in the home.

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Table 1 Demographic Characteristics of Study Population

Characteristic	*Number*	*Percent*
Age		
55-70	35	41.2
71-106	45	52.9
Missing	5	5.9
Total	85	100.0
Gender		
Female	47	55.3
Male	35	41.2
Missing	3	3.5
Education		
Less Than 12 Years	31	36.5
High School Graduate	36	42.4
Some College	11	12.9
College Graduate	2	2.4
Graduate School	1	1.2
Missing	4	4.7
Income		
Less than $10,000	47	55.3
11000-15000	22	25.9
16000-20000	2	2.4
26000-30000	1	1.2
More than $30000	1	1.2
Missing	12	14.1
Total	85	100.0
Marital Status		
Married	6	7.1
Divorced/Separated	25	29.4
Widowed	25	29.4
Other	1	1.2
Missing	5	5.9
Racial Ethnic Group		
African American	67	78.8
Hispanic/Latino	2	2.4
Native American	2	2.4
Asian	2	2.4
Other	5	5.9
Missing	7	8.2
Total	85	100

Table 2
Percent currently using and willing to use health technologies

Type of Device	*Current Use*	*Would Use*	*No Answer*
Sensors	1.2	56.5	42.4
Laser Surgery		48.2	51.8
Pulse Monitor	3.5	51.8	44.7
Scale	8.2	49.4	42.4
Oxygen	3.5	44.7	51.8
Wheelchair	10.6	44.7	44.7
Ramp	8.2	43.5	48.2
Electric Door	8.2	42.4	49.4
Breathing	4.7	42.4	52.9
Heart Monitor	3.5	41.2	55.3
EKG	4.7	41.2	54.1
Bath Strips	20	40	40
Commode	5.9	38.8	55.3
Built up Chair	4.7	38.8	56.5
High Blood Pressure	25.9	37.6	36.5
Raised Toilet Seat	15.3	37.6	47.1
Inhaler	12.9	36.5	50.6
Bath Stool	14.1	35.3	50.6
Computer	11.8	35.3	52.9
MRI	9.4	31.8	58.8
Jar Opener	23.5	29.4	47.1
Pill Holder	27.1	29.4	43.5
Blood Sugar	21.2	28.2	50.6
Cane	34.1	22.4	43.5
Grab Bars	31.8	20	48.2

NOTE-Ranked by Percent Who Would Use the Device If Available

Table 3
Percent of Respondents Who Would Accept Health Technology Devices for Telecare in Specific Situations

Specific Situation: "If the Device . . ."	***Agree***	***Strongly Agree***	***Agree or Strongly Agree***
Sends Health Information to my Doctor	50.6	46.8	97.4
Calls for Medical Help When Needed	49.4	46.8	96.2
Helps Me Manage Medications	57.5	32.9	90.4
Is Something I Wear Everyday to Signal a Nurse that I am OK	54.8	34.2	89.0
Monitors If/When I Fall in My Home	52.7	35.1	87.8
Detects If I Am Able to Get Around as Usual in my Home	45.2	41.1	86.2
Sends Health Information (BG, BP readings) to My Doctor	45.3	40.0	85.3
Allows Me to Get Health Information From the Internet	48.6	33.3	81.9
Allows a Nurse to Check on Me When I am Sick With a Camera	44.0	24.0	68.0

Table 4
Average Scores for Key Indexes by Demographic Factors

Demographic Characteristic	***# Technology Devices Have Now***	***# Technology Devices Would Use***	***Perceived Barriers to Manage Chronic Conditions***	***Positive Attitude Toward Use of Technology***	***Positive Attitudes Toward Successful Aging***
			Mean (standard deviation)		
Age					
55-70	2.1*(2.97)	8.1 (9.20)	3.1*(.70)	3.1 (.59)	3.4 (.68)
71-106	3.7 (3.38)	10.9 (8.72)	2.5 (1.01)	3.2 (.68)	3.4 (.44)
Gender					
Female	3.5 (4.08)	10.1 (8.87)	2.7 (.94)	3.2 (.71)	3.4 (.61)
Male	2.8 (3.40)	8.8 (9.12)	2.9 (.89)	3.0 (.53)	3.3 (.46)
Education					
Less Than 12 Years	2.9 (3.14)	11.4 (9.38)	2.6 (.94)	3.0 (.79)	3.1***(.67)
High School Graduate+	3.3 (4.16)	8.3 (8.64)	2.9 (.89)	3.2 (.49)	3.5 (.40)

NOTE-* p < .04 ** P < .01 ***p < .001

Table 5
Stepwise Regression Coefficients for Positive Attitudes Toward Use of Health Technology by Selected Attitudinal, Health and Demographic Factors

Variables in the Model	*Positive Attitudes Towards Health Technologies (standardized beta)*	*t value*
Positive Attitudes Towards Successful Aging	**.38*** **	**2.80**
Use of Technology		
Number of Health Devices Currently Have	**.37** **	**2.50**
Number of Health Devices Would Use if Available	**.24**	**1.80**
Health Status		
Number of Chronic Conditions Reported	**-.08**	**-0.47**
IADL	**-.16**	**-1.11**
Demographic Factors		
Education (HS +)	**.09**	**0.64**
Age (71+)	**-.03**	**-0.20**
Gender (Female)	**.03**	**0.19**
Adjusted R^2		**.23**

NOTE- P < .01 *** p < .001**

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