HOME MODIFICATIONS: BABY BOOMER INTENTIONS FOR AGING IN PLACE

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After retirement as a software manager at Hewlett-Packard Company (HP), I returned to school and found that art and Interior Design (ID) stimulated a side of the brain that I had not exercised since junior high school. Starting at Cañada College, I developed my ID skills and then came to the FCS Master of Arts program at SFSU, where I've combined ID with my scientific background. It's been a blast, and I feel I have developed the expertise in aging in place that I was seeking.

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Lastly, I acknowledge the love and support of Lowell Sears, without whom I would have few reasons to laugh and enjoy life. May we age in place together for a very long time.

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Chapter 1. Introduction

In the last century, life spans increased 30 years and led to the graying of America (McCartney, 1988). In several AARP (formerly known as the American Association of Retired Persons) surveys since 1995, 80-90% of Americans have consistently said they desire to live in their current residence as long as possible, a concept commonly known as "aging in place" (AARP, 2003). The term caught media attention in the 1980s as baby boomers (boomers), those born within the years 1946 to 1964, were recognized as having become the "sandwich" generation, caring for their children as well as their aging parents (Trevers, 1988). In 2011, boomers began to add another layer to the sandwich, as the oldest boomers turned 65 and joined the ranks of senior citizens.

Statement of the Problem

To age comfortably in one's own home improves perceived health (Fänge & Ivanoff, 2009). However, various studies of earlier generations indicated that less than 15% of older adults would consider relocating or making the home modifications that would enhance independent living and aging in place (Fausset, Kelly, Rogers, & Fisk, 2011; Safran-Norton, 2010; Strohschein, 2002; Yuen & Carter, 2006). Possible home modifications include such things as ramps, railings, grab bars, and even simple fall-reduction strategies such as reducing clutter and removing throw rugs. Further eschewing the issues of aging, two-thirds of Americans optimistically believed that they would always be able to drive a vehicle (AARP, 2003). Realistically, as a person ages, the design or furnishings in the home

may no longer fit that person's abilities, effectively limiting activities (Iwarsson et al., 2007). The inability to perform personal and instrumental activities of daily living has lead researchers to estimate that 44% of older adults will need at least one year of home care in their lives (Kemper, Komisar, & Alecxih, 2005).

When an age cohort initially reaches 65 years, less than 4% are institutionalized, but by age 80, cognitive impairment and physical disability lead 8% to move to assisted living facilities and 14% to nursing homes (Lièvre, Alley, & Crimmins, 2008; "Older Americans," 2012). This does not imply that the remainder of the oldest old is aging in place, as approximately 14% of older adults live in the homes of other relatives or non-relatives ("Older Americans," 2012). There is also a situation where many live alone despite significant impairments. In a 1994 study of Alzheimer's treatment centers in San Francisco, 20% of Alzheimer's patients lived alone, including 50% of those aged 75-84 (Webber, Fox, & Burnette, 1994). This study has not been outdated, as currently, the Alzheimer's Association (2012) estimates the number is 15% nationwide.

The cost of supporting boomers in institutions could be unsustainable, although conversely, there are not enough existing facilities to meet future demand. There are currently 1.7 million nursing home beds (Administration on Aging, 2011), but in 10 to 20 years, there may be 10 million boomers needing institutionalization. An additional threat is the specter of Alzheimer's disease, which develops in 45% of Americans by the age of 85 (Alzheimer's Association, 2012).

For several decades, the U.S. government has recognized the growth in numbers of aging boomers and has encouraged home care as a solution, which aligns with what most people desire. In a recent AARP survey, Keenan (2010) reported that almost 75% wanted to age in place because of closeness to family members, friends, or personally significant destinations such as grocery stores, medical offices, churches, or the public library. However, in an earlier AARP survey, less than half anticipated making the changes they felt were necessary to stay comfortably in their homes, even though subjects characterized themselves as planners (AARP, 2003). There have been few studies to indicate whether a higher proportion of boomers, as compared to earlier generations, are planning for aging in place (Temple & Cockley, 2012).

Purpose of the Study

There are many reasons why people cannot age in place: chronic health or mobility problems, limited income, death of a spouse, and not having adult children nearby (Safran-Norton, 2010). Many people adapt to the challenges of staying in their homes by reducing their activities and quality of life (Wister, 1989). This research sought to identify common characteristics in baby boomers who have proactively taken action, and to explore the extent to which proactive home modifications have a positive correlation with good health, higher socioeconomic status, and having adult children far away (or not having any children). In addition, it sought to explore the extent to which proactive relocation has an inverse relationship with those subject characteristics. The size of homes, the number of

stories, the presence of mortgages, and ethnicity were also explored for tendency to modify or relocate to more appropriate housing.

Understanding boomers who have proactively taken steps to age in place could help designers encourage more clients to follow suit. The hypothesis of this research is that boomers are different from prior generations (non-boomers) in their approach to aging in place. The following research questions guided this study:

1. What are the demographic characteristics of baby boomers who proactively implemented home modifications to enable them to age in place?
2. What modifications did they make?
3. What are the demographic characteristics of baby boomers who proactively decided to relocate rather than modify their homes for aging in place?
4. What is the self-reported well-being of baby boomers who proactively decided to modify their homes or relocated for aging in place?

Justification for the Study

As previously stated, aging in place may be essential for successful aging (McCartney, 1988). Most Americans want to stay in their home as long as possible, but a review of the literature and conversations with industry professionals indicated that few homeowners take the steps to modify their residence proactively in anticipation of aging or illness. This research sought to contribute greater understanding of consumer decision making and also identify the list of home modifications that consumers may consider in order to stay in their homes until the end of life. The results of this research are intended to inform interior designers,

architects, healthcare providers, and Family and Consumer Sciences (FCS) professionals. Understanding proactive boomer behavior offers housing and healthcare professionals the ability to make recommendations based on findings.

Interior designers are in a position to help clients modify their homes to be barrier-free. Convincing boomers to plan their housing for older age is important, because failure to plan translates into few options once frailty disables a person. Planning could help one maintain independence or stay in the home longer with minor help. When one is unable to live independently, formal paid home care is expensive, and for those attached to their homes, institutionalization is undesirable. The findings from this research may also motivate more FCS professionals to advocate for greater public awareness. Continued individual independence into late life will conserve resources for oneself and one's family, one's support network, and the wider community: individual aging in place can benefit all.

Key Terms

Term	Definition
Age-friendly communities	Neighborhoods that provide activities and services to older adults without barriers to their declining mobility and function. They may also be known as lifetime neighborhoods or livable communities.
Aging in place	To stay in one's own home despite the various disabilities that come with aging. It infers living independently or with some assistance at home and excludes institutional living, such as assisted living or a nursing home.
Baby boomers	Persons born in the years 1946 to 1964.
Barrier-free design	For consumers, barrier-free design is used synonymously with universal design.

Built environment	Built by humans, it is the opposite of the natural environment.
Environmental press	How people respond to and cope with environmental demands. Environmental press can be positive in the sense of developing coping skills (agency), neutral, or stressful. When people become frailer and less able to cope with the environmental press, they may curtail activities and social engagement.
Fourth Age	Being 80 years old or over, this is the last age of life and often fraught with infirmity.
Home modifications	Home improvements made to improve the ability to age in place.
Person-Environment Fit (P-E Fit)	P-E Fit is a measure of how well the combination of one's personal physical and mental capabilities with the home environment allow one to function independently and age in place.
Place attachment	A person's emotional bonding to a home, neighborhood, or community through familiarity or social engagement.
Second unit	A second unit is an independent living unit with living, sleeping, kitchen and full bathroom facilities on the same parcel as the single family dwelling it accompanies. It can be an attached or detached unit. It is known as an accessory dwelling unit (ADU), granny flat, or in-law unit.
Third Age	The age between the end of child rearing and the beginning of limits to activity, or approximately 50-64 years old. It is somewhat synonymous with being "young-old" and implies an age free of disease, financial stability, physical and mental health, and community integration.
Universal Design	The concept of designing products and the built environment to be usable by everyone regardless of age or disability, omitting barriers to use.
Visitability	Making a home visitable, i.e., accessible to disabled visitors.
Walkability	The barrier-free nature of a neighborhood so that people can walk in it. Barriers include traffic, safety, lack of street furniture, and litter.
Well-being	For purposes of this research, mental well-being will be measured by whether or not the participant self-reports as being depressed. Physical well-being will be measured by self-reported health and medical conditions.

Statement of Ethical Considerations

This study utilized an anonymous online survey administered through Qualtrics software. On March 27, 2013, the SFSU Office of Research and Sponsored Programs (ORSP) – Human and Animal Protections determined this study (protocol number E13-118) to be exempt.

Chapter 2. Review of Literature

The objective of this literature review is to describe older adult population statistics and housing preferences in the United States, the aging process, how successful aging is perceived, and the many issues around aging in place. In addition, research is cited that may explain why people do not plan for aging and, therefore, need guidance to do so.

Literature Search Strategies

The following electronic databases were used: Abstracts in Social Gerontology, Academic Search Complete, Google Scholar, ProQuest Dissertations & Theses, PsycINFO, PubMed, Sociological Abstracts, and Web of Science. The Internet was searched for government, agency, academic, and foundation websites related to aging and population statistics. Additional articles were found through reference lists in journal articles.

Search terms included: *age-friendly, aging-friendly, aging in place, cohousing, retirement communities, naturally occurring retirement community (NORC), continuing care retirement community (CCRC), housing, senior housing, assisted living, board and care, group homes, nursing homes, skilled nursing facilities, residential care for the elderly (RCFE), accessory dwelling units, ADUs, second units, granny flats, granny-pod, med cottage, granny cabin, home modifications, Alzheimer's, aged, ageing* (U.K. spelling), *aging, elderly, elders, older people, older adults, seniors, successful aging, third age, fourth age, boomers*, and *baby boomers*.

Aging research advanced earlier in Europe and the United Kingdom as compared to the United States. However, their solutions have tended to be specific to real estate, housing, and social systems in those countries. As the situations tend to be different from those of the United States, only a few of the studies in other countries are included in this review.

Population Statistics and Housing Preferences

In the 20th century, the average life span rose from 47 to 73 years (McCartney, 1988). As a result, by 2010, 40 million people 65 years and older comprised 13% of the U.S. population (Werner, 2011). By 2030, boomers will increase the number of older adults to 72 million, or 20% of the population ("Older Americans," 2012).

As reviewed by Folts and Muir (2002), there are a number of housing options available to older adults, such as Leisure-Oriented Retirement Communities (LORCs), Continuing Care Retirement Communities (CCRCs), Naturally Occurring Retirement Communities (NORCs), assisted living, nursing homes, second units (granny flats), multi-generational housing, and cohousing. But in repeated surveys conducted by AARP (2003), 80-90% of respondents were not enthusiastic about these solutions and instead desired to age in place in their own homes as long as possible. For households headed by those aged 55 and over, 80% were owners (MetLife Mature Market Institute, 2011). In addition, 51% of older adults lived in just nine states: California, Florida, New York, Pennsylvania, Illinois, Ohio, Michigan, and New Jersey (Farber, Shinkle, Lynott, Fox-Grage, & Harrell, 2011).

Increasingly, older Americans live alone in single households. In 1960, 20% of Americans aged 65 and over lived alone, and this proportion rose to 37% by 1990 (Lysack, Neufeld, MacNeil, & Lichtenberg, 2002). The U.S. Census Bureau (2011) reported that this proportion had reached 45% by 2010. Part of this steady increase was due to the rise in divorce rates, but it was also acknowledged to be a side effect of a steady income from Social Security. Older women with high school educations or less preferred residential independence and would apply their funds to housing over other consumption (Englehardt, Gruber, & Perry, 2005). At age 65, women outnumber men by a ratio of 3:2, and by age 85, the ratio is 5:2 (Lysack et al., 2002), greatly contributing to the frequency of single households.

The Process and Assessment of Aging

Aging of the human body and mind results in individual changes in physical, mental, functional, and social aspects. If an older adult declines to the point where family or community members see that help is needed, a geriatric professional can assess the individual on that spectrum of abilities. These assessments comprise the measurement of an individual's general well-being and ability to remain independent in response to aging. This section describes the changes that generally occur in aging, when they occur, and how they affect one's ability to remain in his or her home.

Physical changes. Models of aging are generally differentiated as usual, pathological, or successful. In the typical or usual model, older adults adapt to declines in cognitive function, renal function, glucose tolerance, bone density, and

pulmonary function. Their blood pressure increases, and they may suffer benign senile forgetfulness. In the pathological model, the aged are debilitated by diabetes, arthritis, heart or lung disease, and 5-20% over age 65 become senile (Beck, Benson, Scheibel, Spar, & Rubenstein, 1982). As reported in "Older Americans" (2012), disease affects men and women as follows:

- Heart disease: 37% of men and 26% of women
- Hypertension: 54% of men and 57% of women
- Diabetes: 24% of men and 18% of women
- Arthritis: 45% of men and 56% of women

Despite these statistics, 76% of Americans over age 65 rated their health as good to excellent.

Birren and Schaie's work (as cited in Kelly, Fausset, Rogers, & Fisk, 2012) described the common declines of aging in terms of changes in ability:

- Perceptual: Vision is low and/or hearing loss occurs.
- Physical: Range of motion, dexterity, and strength all decline. It becomes difficult for a person to reach, bend, stoop, kneel, crouch, lift, push or pull objects, raise or lower oneself, or stand for longer periods of time. The hands are less able to pinch, grab, turn, or twist objects.
- Mobility: As balance and coordination decline, it is difficult to walk, move quickly, or be steady on one's feet.

- Cognition: It becomes difficult to remember things such as where one put something, or the specific steps of a procedure.

In regards to mobility, 30% of older adults have trouble walking or climbing stairs and must use an assistive device (Smith, Rayer, & Smith, 2008).

Mental changes. Issues in mental changes with aging are most associated with emotional health and cognitive abilities. Not considering life-threatening illnesses or events, older adults need to emotionally adapt to the major life changes and stresses that accompany retirement, empty nests, physical ills, and loss of a spouse or life partner. How one adapts to life transitions can determine whether one remains optimistic or falls into depression. It is generally recognized that emotional health in the face of aging is aided by self-acceptance, identifying a purpose in life, pursuing personal growth and positive relationships with others, and maintaining independence and control over one's environment (McInnis-Dittrich, 2013).

While many older adults acknowledge and accept mild cognitive losses, one of the primary fears of aging is the onset of dementia. It appears that overall, the human brain was not designed to function as well and as long as technology has managed to sustain it. According to the Alzheimer's Association (2012), nearly half (45%) of people 85 and over have Alzheimer's disease. There are different types of dementia in older adults, but Alzheimer's disease accounts for 60-80% of cases. Other major types include vascular dementia from stroke or brain injury, Parkinson's disease, and Dementia with Lewy bodies (DLB). By 2025, when the

boomers have all passed age 85, the Alzheimer's Association estimates the number of Alzheimer's patients will increase from the current 5.2 million to 11-16 million.

Functional changes. In his foundation work, Lawton (1990) defined what are universally known as Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs). Today, the ADL list consists of five items: eating, grooming, toileting, dressing, and bathing (Lysack et al., 2002). They are rated on a scale of dependence to independence without assistive devices. The IADL list now consists of 10 items scored on a 4-point scale. The scores are totaled, and an individual is measured on a range where zero equals complete dependence and 40 equals complete independence. The IADL items include telephone use, financial management, medication use, food preparation, housekeeping, laundry, use of transportation, shopping, driving, and household chores and repairs. Of these IADLs, the subjects' abilities to perform food preparation, use the telephone, and self-administer medication were most significantly correlated with live alone status (Lysack et al., 2002).

In "Health, United States" (National Center for Health Statistics, 2011), Table 145 shows how the need for assistance in ADLs increases from 12% at ages 65-74, to 23% at ages 75-84, and to 46% at age 85 and above. Similarly, assistance for IADLs increases from 16% at ages 65-74, to 22% at 75-84, and to 27% for age 85 and above. The transition from ADL independency to dependency seems to begin around age 80. In an English study of 75 year olds, the health expectancy for

continued ADL independence was observed to be 4.6 years for men and 3.1 years for women. However, cognitive impairment-free expectancy was 8.4 years for men and 9.9 years for women (Sauvaget, Jagger, & Arthur, 2001). In a similar U.S. survey, cognitive impairment was evidenced to start at age 84 for those with 12 or more years of education (Lièvre et al., 2008). Older adults also become increasingly frail, so that by age 85, over 45% are frail. On a 4-unit scale of frailty, the risk of death increased over five times with each 1-unit increase in annual frailty change (Buchman, Wilson, Bienias, & Bennett, 2009).

Social changes. Social support plays an important role in smoothing the life transitions that older adults must face. The support of friends and family is an important predictor of emotional well-being among older adults. Older adults who thrived were those who remained deeply engaged with family, friends, and productive activities (McInnis-Dittrich, 2013). In a 1997 review, Rowe and Kahn concluded that social isolation was a risk factor for health. Social supports in the form of emotional support, such as expressions of affection and respect, and instrumental support, such as assistance, help, chores, transportation, and money, were all health-positive.

Successful Aging

Aging in place is essential to the operational definition of successful aging, where one maintains autonomy, control, and therefore independence, possibly with the help of a social support network. McCartney (1988) described successful aging thusly:

> The truly successful aging individual holds on to [*sic*] autonomy in adaptive ways even in the presence of illness. Too often, the usual pattern is to have autonomy and control eroded either by illness or by the good intentions of others. (p. 173)

In the Rowe and Kahn (1987) model for successful aging, older adults suffer minimal loss of abilities and health through personal habits such as diet, exercise, and nutrition. They advocate a model where older adults pursue engagement with life and high cognitive and physical function, thereby avoiding disease and disability. Successful aging is a concept, a goal, and a pattern of living that people can strive to attain.

While striving to be proactive is good, taking personal responsibility is sometimes not enough. Scharlach (2012) noted that too often, aging is perceived as an individual problem. The individual works to maintain personal responsibility, privacy, and control, but when this fails, the problem migrates to family responsibility—if the individual has that option. Only after all personal resources are exhausted does public support become available. Scharlach advocates age-friendly communities as a societal solution, improving people's ability to stay in their homes.

While age-friendly communities are a bonus to an aging homeowner who is lucky enough to live in such a neighborhood, the focus of this study is along the line that successful aging comes from taking individual responsibility. Thus, the research sought to understand why, despite repeated calls for action, people continue not to plan for aging in the home.

How can Interior Designers Help Clients Achieve Successful Aging?

Consumers need help to modify their homes and move forward in their efforts to age successfully. To properly advise as well as educate and guide them, interior designers need to understand the aging process, the desire to age in place, the types of home modifications, and the importance of fall prevention. This section of the literature review covers these topics.

The desire to age in place. As stated in the introduction, AARP (2003) has conducted many telephone surveys to conclude that 80-90% of Americans want to age in place. Additionally. Keenan (2010) found that 75% wanted to age in place because of closeness to family members, friends, or personally significant destinations such as grocery stores, medical offices, church, or the public library. Aging in place is perhaps a universal desire. European and U.K. studies have found similar results (Davey, 2006; Fänge & Ivanoff, 2009), and in Sweden, the right for home help services to age in place was legislated in 1987 (Hammarström & Torres, 2012).

As people age and collect many belongings and memories, home accumulates even greater importance. Cookman (1996) proposed the desire to stay put could be due to attachment theory, where objects in our environment define us. Sixsmith and Sixsmith (1991) identified home as a reminder of past competencies and a refuge from an exclusionary youth-oriented society. In addition, their subjects revealed that moving to a less-challenging home environment was an admission that they were approaching the end of life. The researchers concluded:

> To remain at home suggests that one is still able to do the things that one has always done, and in this sense, to keep one's own house is to deny some of the less acceptable changes that are often encountered in later years. (p. 189)

Benefits to aging in place have been observed. Evans, Kantrowitz, and Eshelman (2002) showed that place attachment mediated a positive effect on psychological well-being, whereas housing quality did not. Very old residents receiving home help services in Sweden derived higher perceived health from the accomplishment of daily routine tasks, even if the tasks became demanding and risky (Fänge & Ivanoff, 2009). In U.S. social work practice, the home and its memories are recognized as a source of strength and well-being for individuals, and the goal of the multidisciplinary geriatric team is to maintain a client's sense of independence, choice, and control for as long as the client is capable (McInnis-Dittrich, 2013). On the other hand, in a large English study, aging in place had no effect on well-being (Gilleard, Hyde, & Higgs, 2007).

Not many achieve aging in place. The desire to stay in one's home is strong despite discomfort or the need for repair (Cookman, 1996). However, in the University of Michigan's 1972-1992 Panel Study of Income Dynamics, over a 20-year period only a minority was able to stay: 31% of households ages 50-60 at baseline, 20% for ages 61-70 at baseline, and 5% for ages 71-85 at baseline (Sabia, 2008). In a 2002 Community Partnerships for Older Adults Program Survey, the proportion who expected to stay in their homes fell dramatically with age: 60% of households

ages 50-64, 23% at ages 64-74, and 17% at ages over 74 (Tang & Pickard, 2008). In this survey, most participants expected to relocate between the ages of 80-89 years.

In some cases, older adults may be aging in place even though they prefer not to do so. Keenan (2010) reported that 25% could not afford to move. In a Canadian study, Strohschein (2012) reported that 10% were involuntary stayers, and that these individuals were more likely to be socioeconomically disadvantaged, renters, in poor physical and mental health, requiring more help with daily activities, and having lower levels of social involvement.

Home modifications. Half of older adults live in a home over 40 years old, but in one study, only 4-11% had made home modifications in any price range from shower seats to ramps, railings, or wheelchair access (Safran-Norton, 2010). In another study, 14% lived in homes that needed significant modifications or repairs (Feldman & Oberlink, 2003). On the other hand, the National Association of Home Builders (NAHB) claimed that in 2008, 70% of home remodelers had installed changes for aging in place (as cited in Scharlach, 2012).

When homeowners did not make home modifications, Wister (1989) found that subjects instead adapted their behavior by accepting limitations as inconveniences, redefining what constituted adequate living conditions, and denying deteriorating competence. However, making modifications does not assure staying in the home. According to Safran-Norton (2010), modifications are of little significance when compared to personal variables such as chronic health problems,

functional mobility, income, death of a spouse, memory, incontinence, and having children nearby. More research in this area would illuminate the question of the effectiveness of home modifications. It may well be, as shown in the next section, that home modifications need to be combined with therapies to improve one's ability to live independently.

The importance of fall prevention. Fall prevention is an important health strategy. Falls are the leading cause of accidental injuries in the elderly, resulting in 10-15% of emergency room visits and 6% of hospitalizations, and they are the leading cause of traumatic brain injury (Lau, Scandrett, Jarzebowski, Holman, & Emanuel, 2007). For elders who lived alone, after hospitalization for a medical event such as stroke or hip fracture, only 39% (MacNeill & Lichtenberg, 1997) to 58% (Lysack, 2002) returned to independent living. Stroke and hip fracture were found to be the two biggest predictors of housing relocation in later life (Wolf & Wilmoth, 2010).

Home hazard reduction should therefore be part of a health strategy. One-third to one-half of home falls are the result of environmental hazards (Yuen & Carter, 2006) such as slippery floors, inadequate lighting, loose rugs, unstable furniture, and obstructed walkways (Lord, Menz, & Sherrington, 2006).

However, home hazard reduction by itself may not reduce fall rates. A multi-faceted approach with both behavioral and home modification is more effective (Lord et al., 2006). Laura Gitlin, now at John Hopkins University, conducted several

randomized trials in the ABLE project along with others at Thomas Jefferson University. In these trials, the ABLE project provided 70-year-olds a combination of occupational therapy, physical therapy, and minor home modifications. At 12 months, the treatment group had a 1% mortality rate versus 10% in the control group. The treatment continued to show survival benefits up to four years later (Gitlin, Hauck, et al., 2009; Gitlin, Hauck, Winter, Dennis, & Schulz, 2006; Gitlin, Winter, et al., 2006; Gitlin, Winter, Dennis & Hauck, 2008).

Other Issues about Aging in Place

This section of the review covers additional issues that affect a homeowner's ability to age in place: financial resources, ability to keep up with home maintenance, and ability to drive. Whether or not an older adult can afford to stay in the home, maintain it, and find transportation are key factors in staying put.

Financial resources. As mentioned earlier in this review, a side effect of a steady income may have been an increase in the proportion of older adults living alone (Englehardt et al., 2005). Studies of the financial assets of retirees from generations preceding the baby boomers showed that most households entered retirement without substantial assets. Social Security income accounted for 55% of the annual household income for those 65 and over (Fry, Cohn, Livingston, & Taylor, 2011). In an analysis of the National Institute of Aging's Health and Retirement Study (HRS), Bearden and Wilder (2007) found that one-third received 90% of their income from Social Security. In that study, total wealth for single persons was less

than half that of married/remarried households. Older adults living alone thus face more financial barriers to age in place.

The baby boomers experienced a huge inflation of real estate prices and might seem more financially secure. Home equity has historically comprised a large part of net wealth, and in 2001, it was estimated to account for at least half of net wealth for half of all households (Nothaft & Chang, 2004). But a more recent analysis of 2007-2010 data showed that the collapse of the economy and real estate market led to a 55% decline in median net worth for families in the western United States. As a result, the home accounted for just 29% of net worth (Bricker, Kennickell, Moore, & Sabelhaus, 2012).

Besides the decline in real estate prices, boomers may also be less secure because of their greater assumption of home debt. A recent analysis showed that 65% of older homeowners had no mortgage (Fry et al., 2011). But prior to the collapse, Masnick, Xiao, and Belsky (2006) reported that baby boomers had twice the housing debt of prior cohorts, and that 42% of their income was dedicated to home expenses. In addition, they reported that the percentage of homeowners aged 55-64 that had no mortgage had declined from 54% in 1989 to 39% by 1998.

It should be noted that financial security is not the top-most contributor to well-being. While wealth and education are important predictors of well-being at retirement age, health is by far the most important; however, in turn, better health increased household wealth 25-37% (Bearden & Wilder, 2007).

Home maintenance. Home maintenance can be a heavy burden for older adults. Lawton (1990) found that home maintenance tasks required more than one hour every day. The burden can be a determining factor in staying in the home (Bronstein, Gellis, & Kenaley, 2011). Fausset et al. (2011) found that 9% decided to move and 6% were able to make home modifications, but 7% simply let the tasks go. Their subjects cited difficulty with tasks such as cleaning, outdoor-related chores, and home upkeep such as changing heating filters, light bulbs, and smoke alarms. Fifty-four percent of the home maintenance tasks were outsourced.

Transportation. Transportation is another task that becomes difficult for older adults. Because of suburban sprawl, older adults use a car for 90% of their outings (Rosenbloom, 2009). Not being able to drive, which affects 21% of Americans over 65, causes half of these to not leave the home most days, leading to 15% fewer doctor appointments, 59% fewer shopping trips, and 65% fewer social, family, and religious activities (Bailey, 2004).

The Decision to Relocate

In a review of aging in place, it is important to also look at the alternative of relocation. In 1987, Litwak and Longino proposed the first model for relocating in later life (as summarized in Carpenter et al., 2007). With the relatively healthy-and-wealthy newly retired, some relocated in a sometimes long-distance move to an amenity-rich retirement community in an area of lower taxation. In the second stage, with the onset of chronic disability, elders moved in closer proximity to

family. The last stage was the move to a nursing home when the family members were too overwhelmed to provide the level of care needed.

Luborksy, Lysack, and Van Null (2011) suggested that relocation and downsizing could be a normal course in the progression of life events: marriage, children, retirement, and downsizing. In addition to the previous influences on aging in place that have been discussed in this review, they found the issue of persuasion by family or friends, where relocating was an obligation of the elder to reduce burden on their family.

Relocation to a retirement community may not be permanent, or it may not be the end of life experience that people expect. Shippee (2009) found that when residents in independent living units had to transition to assisted living or nursing facilities within a continuing care retirement community (CCRC), the subjects experienced "disempowerment and social death." They lost interaction with the friends that they had made in the CCRC.

A recent movement has been the push for age-friendly communities that promote well-being and inclusion through service provisioning, opportunities for volunteerism, and social activities (Scharlach, 2012). Naturally Occurring Retirement Communities (NORCs) are not intentional communities, but neighborhoods where people naturally age together or other older adults move in, to the point where 40% of the heads of household are age 60 or over. At that point, there are efficiencies in providing health and social services within the locality

(Colello, 2007). NORCs and other self-identified age-friendly communities are places that older adults could consider for relocation, if they do not already live in one.

Other qualities of age-friendly communities include walkability—where there are no barriers to walking or wheelchairs—and access to shopping or public transportation. Just walking to public transit stops was found to provide physical activity of more than 30 minutes per day (Besser & Dannenberg, 2005), which is beneficial to health.

Is There Really a Market for Aging in Place?

In the 1980s, the Greatest Generation—the cohort that grew up during the Great Depression and fought in the Second World War—entered the age of declining abilities. The children of the Greatest Generation became the sandwich generation (Trevers, 1988), and the public conversation about aging in place began to take root. But even though the problem of housing for the elderly was recognized more than 30 years ago, studies found for this review showed little evidence that people take action to address the issue. For interior designers and architects to persuade consumers of its necessity, it may help to understand ageism, age denial, and consumer decision making.

Ageism and age denial. It is a truism that no one wants to get old. Unlike in older generations where age was respected, contemporary society equates old age with decline, illness, and death (Gullette as cited in Wilińska, 2012). Like other forms of discrimination, ageism—a negative attitude towards people because they

are old—leads to stereotyping, discrimination, and marginalization (Butler, 1989; McInnis-Dittrich, 2013).

Rather than admitting to growing old, it seems the prevalent attitude in America is to ignore or deny that it is taking place. In a local study of 38 persons aged 62 to 85, all but three conducted their social and shopping activities outside their neighborhoods, but most had no plan for what they would do if they could no longer drive (Yen, Shim, Martinez, & Barker, 2012).

In a 2003 AARP study of respondents ages 45 and over, 44% agreed "it was pointless to plan future housing situations until specific needs arose" (p. 16), even though 87% of them considered themselves to be planners. In addition, 64% believed that they would always be able to drive. The AARP study considered the responses to be "an unrealistic sense of optimism about the future" (p. 3).

Who are the most likely to pursue home modifications? Occupational therapy research has shown that patients tend to resist change and that only 15% follow recommended home modifications to reduce falls (Yuen & Carter, 2006). The exceptions tended to be those who had previously made modifications. An analysis of the 1994 survey of Asset and Health Dynamics of the Oldest Old (AHEAD), showed that home modifications were associated with having had joint replacement surgery in the prior year (Tabbarah, Silverstein, & Seeman, 2000). In a study of Canadians over 73 years old, 85% of participants declined to make home

modifications, and it correlated with the perception that they had limited remaining time (Wister, 1989).

Consumer Decision Making

The Health Belief Model (HBM) is a psychological theory that explains and predicts patients' acceptance of health recommendations. Ohta and Ohta (1997) applied the HBM to consumer decision making when faced with home modifications to correct a barrier to staying in the home. They predicted that consumers would only act if they perceived their problem was highly severe, they were highly susceptible to it, the adaptation would be highly effective, and the economic, social, or behavioral cost would be low. For example, consumers would consider the questions:

- Would the consequences of inaction be incapacitating or simply inconvenient?
- Would the modification be affordable?
- From a social perspective, would the modification make the home less attractive or bring attention to a disability?
- As far as behavioral cost, would the modification disrupt one's lifestyle or reduce self-esteem?

Thus, within the context of the HBM, the consumer perception of necessity could vary a great deal from a professional's recommendations. Ohta and Ohta suggested that health and housing professionals break down client concerns into

tasks and offer a range of adaptations for each task. Understanding baby boomers who have made home modifications for aging in place may shed some light on their decision making in the context of the health belief model.

Implications of Failing to Plan

If the lack of a plan for aging in place leads to the need for long-term care (LTC), the cost could easily exceed one's retirement assets. Kemper et al. (2005) simulated the costs and need for LTC and estimated that 44% would need home care for at least one year. In addition, the average LTC expenditure, in 2005 dollars, was estimated at $47,000, with 16% spending more than $100,000, and 5% spending more than $250,000.

Given these kinds of scenarios, it is unfortunate that age-denial about home modifications seems to persist in the population. The problem of lack of planning could be unsolvable, or it could be a matter of education of both consumers and design professionals.

Literature Summary

This review has described the aging process and its concomitant declines. Americans have consistently expressed the desire to age in place, a concept that embodies successful aging with the retention of personal independence and control. But less than 15% of Americans make home modifications to enable this goal, and perhaps less than 20% of older adults accomplish it. In particular, home hazards and falls can lead to hospitalization, which leads to the inability to continue living

independently. Fall prevention is an important health strategy that can be accomplished with home modifications in combination with therapies.

The ability to stay in the home is also affected by financial resources, home maintenance burden, and transportation issues. Boomers have held higher levels of debt and have incurred significant decreases in net worth in the current recession. The situation is exacerbated by the increase in single households, where almost half of older women live alone due to divorce or widowhood. They are less likely to age in place for reasons of economics as well as the lack of a spouse as a caregiver. Maintaining a home becomes difficult as people age. Suburban sprawl makes driving a necessity, leading cities to strive for age-friendly communities where walking and public transportation are acceptable alternatives.

Ageism and age denial may contribute to the lack of planning for aging in place. Older adults do not take action because to do so would admit they are aging. But inaction could result in the need for long-term care, which could easily exceed one's retirement assets. The Health Belief Model may be a framework for explaining consumer decision making and the reluctance to take the necessary steps to age in place. Relocation or downsizing to a smaller home is another option for aging in place. The consumer may choose to age in place in a different home, with the goal of continuing to preserve autonomy and prevent institutionalization.

Chapter 3. Method

Overview of the Procedures

This cross-section study utilized quantitative data from an anonymous online survey. The original objective of this study was to recruit a purposive sample of 100 baby boomers and 100 subjects of older age cohorts, who had implemented home modifications or relocated in order to age in place. A Qualtrics instrument was used, consisting of 29 close-ended questions and one open-ended question, requiring less than 10 minutes to complete. The survey questions are listed in Appendix A. Survey responses were collected over a 5-week period from October 22 to November 17, 2013.

Based on the literature research, it was assumed that, given the trend towards age denial, it might be very difficult to find a proactive cohort. Therefore, the decision was made to recruit any participant over age 50 who lived in the United States. The study qualifications did not require having made any home modifications. This approach allowed casting a wider net to obtain a large sample that would serve several purposes:

1. Study results would compare with or validate prior results from the literature, which indicated less than 15% of older adults were willing to make home modifications in order to stay in their home (Fausset, Kelly, Rogers, & Fisk, 2011; Safran-Norton, 2010; Strohschein, 2002; Yuen & Carter, 2006).
2. A large age-diverse sample would make it possible to statistically compare boomers versus older cohorts.

3. It would be possible to statistically compare those who had taken action to age in place versus those who had not.

Sample Pool

Specific parameters and qualifications to participate in the study included:

- Self-reported age of at least 50 years old as of December 31, 2013.
- Self-reported as living in the United States (optionally, half of the respondents input their zip code).
- An approximate time commitment of ten minutes.
- The survey was only available in English.
- Participants were required to access the online survey via a computer and the Internet.
- Participants were not knowingly recruited from a vulnerable population.

Recruitment Procedures

The researcher visited several senior centers and spoke with local gerontologists. It became apparent that the average senior center member was approximately 80 years old, and that the general membership did not have the computer skills needed to participate in an online survey.

Due to these challenges, all survey recruitment was conducted using the convenience methods of purposive and snowball sampling via online social networks, blogs, media, and other online venues. Recruitment emails, containing a short description and a hyperlink to the survey, were sent to various venues. The email requested that the responsible party spread the word by blogging, tweeting,

forwarding, or posting the survey link on Facebook. The researcher developed a portfolio website that showcased past projects and the aging in place research. This drew media attention within two days of publishing the website for public view. The website provided a link to the survey. At the end of the survey, the user could follow a link to the portfolio Contact Me page and request a copy of the final survey results. Examples of the recruitment emails and media posts are in Appendix B.

Instrumentation

A Qualtrics (2009) instrument was created which consisted of up to 29 close-ended questions and one open-ended question. Two-thirds of the respondents completed the survey within ten minutes.

In order to characterize homeowners who had implemented home modifications, survey questions were integrated from a number of existing instruments. Original questions were also developed for this study, as noted in the outline below. The survey questions are listed in detail in Appendix A.

1. Importance of aging in place and aging-friendly communities (2 multi-choice questions from Keenan, 2010) and one question (developed for this study) which asked if the subject moved to the current home in order to age in place.
2. What were the reasons for taking action or not taking action (developed for this study).
3. Characteristics of the current home, such as duration of occupancy, square footage, home equity, single family, and single story (developed for this study).

4. Characteristics of neighborhood or community such as safety, walkability, stimulation, transportation, shopping, and opportunities for employment and volunteerism (developed for this study).
5. Inventory of home modifications that are in place (as listed in Peterson and Liebig, 2005), plus a few modification suggestions developed for this study.
6. Single item Yale Depression Screen (Mahoney et al., 1994).
7. Extent of social network (modification of Glass, De Leon, Seeman, & Berkman, 1997).
8. Self-reported health status and medical conditions (developed for this study).
9. Demographics from the AARP survey (Keenan, 2010), which also reflect U.S. Census Bureau questions.
10. Open-ended question about subject's experience with accomplishing home modifications (developed for this study).

Variables

Table 1

List of Variables

Characteristics of the home • Length of residency • Square footage • Home percentage of net worth • Mortgage or rent • Type of structure • Single or multi-story • Age-friendly community Self-reported well-being and health • Depressed • Health status • Medical conditions Social support network • Size of network • Location of network • Reciprocal relationship	Motivations • Desire to age in place • Action taken • Reasons for home modifications • Reasons for relocating • Reasons for taking no action Modifications in the home • Major features installed • Minor features installed Subject demographics • Age • Gender • Marital status • Education • Income • Size of household • Zip code

Internal Validity. In order to support the content-related validity of the relationship inferences of this research, the instrument was reviewed by experts to ensure appropriateness, correctness, meaningfulness and usefulness. Expert review included SFSU faculty comprising the thesis committee. SFSU Associate Professor of Psychology Ryan Howell and ten graduate students in the SFSU CFS/D and Gerontology departments tested a prototype survey. As a result, some questions were clarified and reformatted, and the survey was verified to work properly across multiple platforms. In addition, the prototype testing revealed a problem with the

configuration of survey options. To prevent any user frustration, participants were not restricted to a single use of the survey. Details are provided in Appendix C.

External Validity. The findings from this research were intended to be generalizable to the population that interior designers and other professionals frequently serve. The single open-ended question was used to augment the quantitative data in the survey and improve the study's external validity.

Data Analysis Methods

In order to identify relationships between variables and to make comparisons between age cohorts, the data were analyzed using frequency distributions and descriptive statistics. Comparisons were made between boomers (ages 50-64) and non-boomers (ages 65 and over) using chi-square and independent sample *t*-tests.

The responses to the single qualitative open-ended question were analyzed to isolate anecdotal examples as well as identify themes which should be considered in further research on aging in place.

Chapter 4. Results

Approximately 30% of the participants had made home modifications to age in place. There were few differences between boomers and non-boomers in subject characteristics, but the actions taken differed significantly.

Sample Characteristics

Table 2 presents the sample characteristics of the 225 participants. Qualified participants self-reported their age as being in the range of 50-64 (57%), 65-74 (26%), 75-84 (15%), or 85 and over (<3%). For comparison purposes in this study, the respondents were characterized in two groups, where boomers were defined as ages 50 to 64 (57% of subjects), and the three older subgroups were combined as non-boomers encompassing ages 65 and above (43% of subjects). Overall, there were no notable differences within the non-boomer subgroups. The oldest-old group was too small for useful analysis. The majority of participants were White (91%), 69% were female, and only 25% lived alone. Over two-thirds (71%) were married or living with a significant other, while 29% were single, divorced, separated, or widowed.

Only 7% were renters or living rent-free; on the other hand, 47% had a mortgage, and 45% owned their home without any mortgage. Most of the participants (81%) lived in single-family residences, with 11% in condominiums or townhouses, 5.6% in multi-unit buildings, one person in senior housing, and four people in mobile homes. Participants' homes were split almost evenly between one level (48%) and two-story or split-level homes (52%).

Most of the subjects were long-term residents of their homes; only 15% had lived in their homes for five years or less. Of those who responded to the question, 65% felt their home comprised one quarter to more than half of their net worth.

Forty percent of respondents said they learned about the survey from a friend. Only 12% of the participants did not have a college degree; 33% had a

Table 2

Sample Population Demographics

	Percent of Boomers age 50-64 (n = 128)	Percent of Non-Boomers age 65+ (n = 97)
Demographics		
Female	68.8	69.1
White/Caucasian	89.1	92.5
College graduate	41.7	21.5
Advanced degree	46.7	65.6
Annual income <$50,000	6.7	16.1
Housing		
11 to >20 years in home	69.4	82.1
1-person household	16.5	35.8
Married or co-habiting	79.2	60.2
Single family residence	82.6	79.0
Living area on one level	50.0	46.3
Square footage <2,500	68.3	63.2
Homeownership		
Have a mortgage	53.3	40.0
Own home with no mortgage	39.2	52.6
Pay rent or rent-free	7.5	7.4
Health		
Very good to excellent health	74.4	61.1
Chronic health conditions	14.8	23.7
Psychosocial		
Often feel depressed	9.2	7.4
Zero to two close relationships	20.8	19.0
3 or more close relationships	79.2	81.1

bachelor's degree, and 55% had an advanced or professional degree. This is probably an artifact of snowball sampling via aging websites and forums, where many of the participants are health care professionals, industry professionals in the fields of gerontology or aging in place, or academicians.

The snowball sampling method succeeded in achieving a nationwide distribution of respondents. Half of the respondents supplied their zip codes; a zip code distribution map is shown in Figure 1.

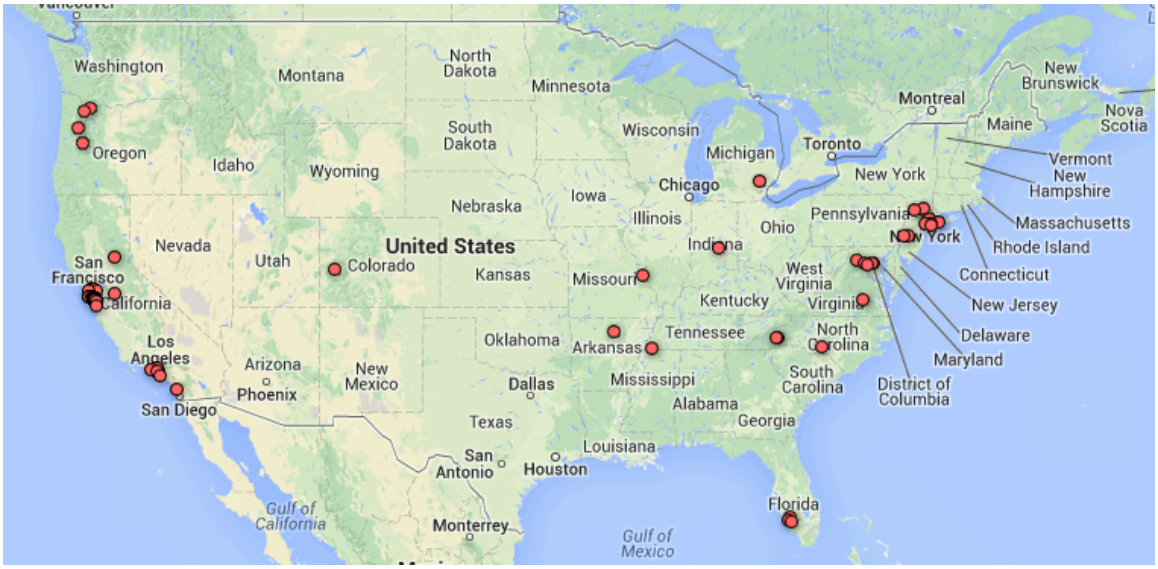


Figure 1. Respondent zip codes. Shows the distribution by zip code of approximately half of the respondents, who optionally provided this information. The red dots indicate zip code but do not indicate the number of participants at each location.

Desire to Age in Place

In this study, respondents indicated on a 5-point Likert scale how much they agreed with the statement: "What I'd really like to do is stay in my current home as long as possible." This is a question that AARP has used in its seminal telephone studies, which demonstrated that 80-90% of Americans prefer to age in place. As shown in Table 3, overall, 78% of respondents agreed or strongly agreed with the statement. For those aged 75 and above, the agreement was 85%. These results are in accordance with, but slightly less than, the AARP studies.

Table 3

Respondents' Desire to Age in Place as a Percentage of an Age Category

Age range	n	Strongly Agree	Agree	Net Agreement
50-64	126	47.6	27.8	75.4
65-74	58	60.3	17.2	77.6
75+	39	61.5	23,1	84.6
ALL	223	53.4	24.2	77.8
Boomers	126	47.6	27.8	75.4
Non-Boomers	97	60.8	19.6	80.4

Reasons for Taking Action

Respondents were asked if they had modified their home or relocated in order to age in place (see Figure 2). The results are shown in Table 4. Although

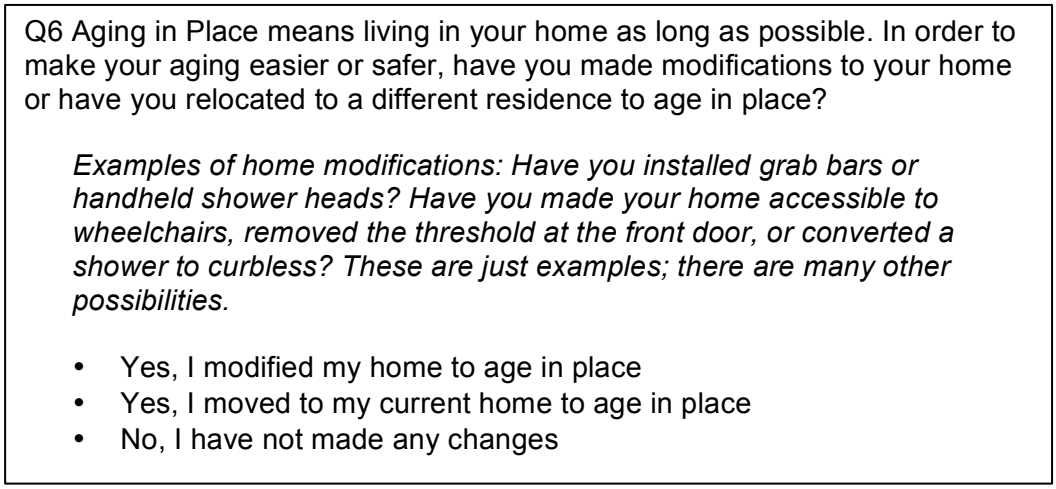


Figure 2. Question #6 asked what actions subjects had taken for aging in place.

other researchers have found that 15% or less made home modifications, in this study, a surprising 30% of respondents had taken such action to age in place. In addition, 12% had relocated, and 57% had made no changes. Findings showed that as age increased, there was a higher frequency of home modifications and a lower frequency of not making any changes. Because categorical data were used, correlations could not be computed. Chi-square analysis of boomers versus non-boomers showed a significant difference between the two cohorts.

Fewer than one quarter of boomers had made home modifications, compared to 38% of the older cohort. The proportions of boomers who had modified the home, moved, or made no changes, were .24, .12, and .64 respectively. The proportions of boomers modifying the home and making no changes differed significantly from the non-boomer proportions (.38 and .48 respectively, χ^2 (2, N = 225) = 6.011, p = .0495). The proportion of moving in order to age in place stayed consistently around .12 to .14 regardless of age (.13 for non-boomers).

Table 4

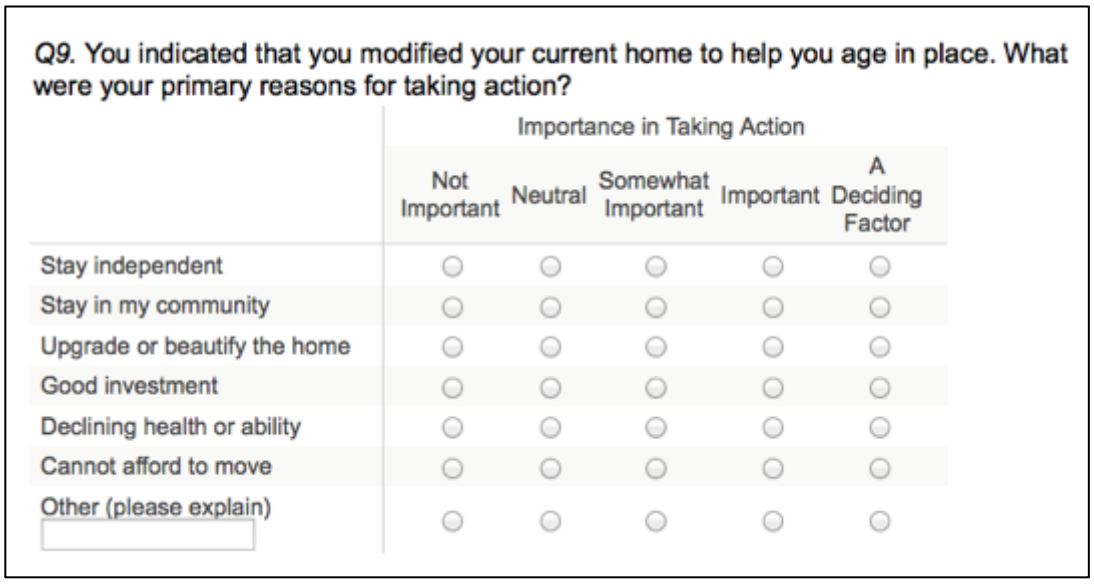
Analysis of Participants' Actions for Aging in Place

	Boomers	Non-Boomers	Total
Modified home	31 24%	37 38%	68 30%
Moved	15 12%	13 13%	28 12%
No changes	82 64%	47 48%	129 57%
Total	128 100%	97 100%	225 100%
χ^2	6.011		
Degrees of freedom	2		
p-value	0.0495		

Note: Boomers are aged 50-64. Non-Boomers are all respondents aged 65 and above.

Depending on the action/inaction that the participant had selected in Question #6, the participant was presented Question 9, 10, or 11 in a format as

shown in Figure 3. These questions suggested specific reasons the participant may have used in deciding to act or not act in order to age in place. Each reason had a 5-point Likert scale for the participant to specify agreement.



Q9. You indicated that you modified your current home to help you age in place. What were your primary reasons for taking action?

	Importance in Taking Action				
	Not Important	Neutral	Somewhat Important	Important	A Deciding Factor
Stay independent	○	○	○	○	○
Stay in my community	○	○	○	○	○
Upgrade or beautify the home	○	○	○	○	○
Good investment	○	○	○	○	○
Declining health or ability	○	○	○	○	○
Cannot afford to move	○	○	○	○	○
Other (please explain)	○	○	○	○	○

Figure 3. Question #9 asked subject's reasons for home modifications.

Other reasons for action or inaction. For the questions of home modification and relocation, an *Other* response option was available, where the respondent could explain her/his specific reason in an open-ended text entry field. Nearly 5% of the participants (10-15 subjects in each of the three response categories) listed *Other* reasons, most of which were deciding factors in their decisions to modify the home or relocate.

Modifying the home. In Question #9, respondents indicated how much they agreed with the suggested reasons for making home modifications: stay independent, stay in my community, upgrade or beautify the home, good

investment, declining health or ability, cannot afford to move, or other. The fifth point on the Likert scale was defined as *A Deciding Factor* instead of *Very Important*.

Table 5

Reasons for Modifying the Home

	n	M	SD	Net Agreement
Stay independent	64	4.22	0.86	81%
Stay in my community	63	3.73	1.30	70%
Other	15	3.53	1.77	60%
Upgrade/beautify home	61	3.39	1.37	56%
Good investment	61	3.15	1.28	44%
Declining health/ability	57	2.77	1.51	35%
Cannot afford to move	56	1.80	1.20	11%

In Table 5, the results are sorted by the average scores for each reason. Staying independent and remaining in the community are the most important factors, with 81% and 70%, respectively, selecting these as important or deciding factors. Secondarily in importance, with approximately half of respondents in agreement, were the reasons of upgrading or beautifying the home and being a good investment. The factors of declining health or ability were the least important, with only approximately one-third in agreement. Very few of the respondents (11%) had made modifications because they could not afford to move.

Approximately one-quarter of the respondents used the text entry field to explain other reasons for making modifications, and these were usually important to them. The unanticipated two most frequently cited other reasons were the need to house parents for aging in place and for safety or universal design. Regarding the

latter, the consumer decision was purely proactive and not due to currently being in a state of declining health.

Relocating. In Question #10, respondents indicated how much they agreed with the suggested reasons for relocating to age in place: move near adult children, upgrade to a better home, move to a better community, economic reasons, declining health or ability, difficulty maintaining home, or other. For this question, the fifth point on the Likert scale was defined as *A Deciding Factor* instead of *Very Important*.

Table 6

Reasons for Relocating

	n	M	SD	Net Agreement
Other	10	4.60	1.26	90.0%
Move to better community	23	3.26	1.63	52.2%
Upgrade to a better home	20	3.00	1.75	50.0%
Economic reasons	20	2.35	1.39	20.0%
Declining health/ability	19	2.32	1.67	26.3%
Home maintenance	20	2.20	1.51	20.0%
Move near adult children	19	2.00	1.45	21.1%

As illustrated in Table 6, reasons for relocating are more diffuse than reasons for home modifications. Approximately 50% of respondents agreed with the importance of moving to a better community and upgrading to a better home. The remaining reasons were concordant with less than one quarter of the respondents. Similar to home modifications, declining health was not a significant reason for relocating. Interestingly, 58% of relocated respondents felt that moving near adult children was not important. This selection had the highest number of respondents

who responded negatively to it, which could possibly be because the adult children were already nearby.

Alternatively, ten, or almost half, of the relocated participants used the text entry field to explain other reasons for moving. These were very important to respondents, with almost all of these reasons rated as deciding factors. These included divorce, moving to a one-level home, seeking a more social environment, and—most frequently cited—downsizing. Including the options of downsizing or change in marital or family status as separate reasons were not originally considered for this question, yet it is clear that study repetition should include these options. One respondent moved to a one-story home in order to better care for dogs that required heavy lifting.

Taking no action. In Question #11, respondents indicated how much they agreed with the suggested reasons for not making any changes to age in place: do not feel it is necessary, economic reasons, am still in planning mode, have not had time, will probably move, or other. For this question, the standard 1 to 5 point Likert scale of S*trongly Disagree* to *Strongly Agree* was used.

Respondents who did not make any changes comprised the largest action subgroup in the survey, encompassing 57.3%, or 129 of the 225 respondents. As shown in Table 7, two-thirds agreed or strongly agreed that it was not necessary to make any changes, with the highest agreement (78.6%) occurring in the oldest cohort of 75+ years old.

Table 7

Reasons for Not Taking Action

	n	X	SD	Net Agreement
Other	15	4.00	1.41	73.3%
Not necessary	105	3.72	1.31	63.8%
Still planning	99	3.34	1.36	55.6%
Will probably move	100	2.85	1.42	35.0%
Have not had time	93	2.62	1.30	25.8%
Economic reasons	92	2.52	1.27	27.2%

A little over half (55.6%) of respondents who did not take action indicated they were still in planning mode, but 44% said their inaction was not due to a lack of time. The remaining selections garnered only around one-quarter agreement. But similarly to the other reasoning questions, approximately 12% (15 respondents) input other reasons for inaction. In general, these were that the home was basically unsuitable for aging in place (too large, too many stairs), or that it was too early to think about the issue. These were essentially nuanced explanations of the listed selections, but better wording of the suggested reasons should be considered in any future study.

Home Modifications

Respondents were asked to check off features that could help as one ages and which they had in their home and living area. Question #17 listed nine major (i.e., more costly) features, and question #18 listed nine minor features. The incidence of these features in the respondents' homes is shown in Tables 8 and 9. Note that

participants were only asked if they had the features, and not whether they had initiated the installations.

The frequencies did not indicate any significant differences between age ranges. Overall responses indicated a surprising number of elevators/lifts (9.6%), zero threshold entrances (13.2%), grab bars (35.8%), curbless showers (13.7%) and electric toilet seats (4.1%). This could reflect the bias in the sample population that resulted from high education levels and possibly being industry professionals. It could also be a reflection of the number of baby boomers caring for parents at home. Resampling with more demographic diversity and inquiring about family members would be areas for future study.

Table 8

Incidences of Major Home Modifications

Answer	Bar	n	%
A bedroom (or a room that could be used as one) on the main level of the residence		180	91.4
A full bath (sink, toilet, and bath tub or shower) on the main level		178	90.4
Wide doors that easily accommodate a wheelchair		99	50.3
Wide hallways that easily accommodate a wheelchair		104	52.8
A roll-in or curbless shower		27	13.7
An entrance without steps		52	26.4
A zero-threshold entrance		26	13.2
An elevator, stair, or platform lift		19	9.6
Non-slip flooring (e.g., linoleum, rubber, or cork) in wet areas		50	25.4
Total		735	100.0

Note: Question #20 asked: “The following features in a home can help as one ages. Check all that are in your home and living area”.

Table 9

Incidences of Minor Home Modifications

Answer	Bar	n	%
Lever door handles		81	42.0
Hand rail at steps or in hallway		97	50.3
Grab bars anywhere in the home		69	35.8
Shower seat		46	23.8
Hand-held shower head		121	62.7
Single-lever faucet		109	56.5
Touchless faucet		2	1.0
Higher toilet seat (17-19" versus 14-15")		59	30.6
Washlet or electric toilet seat		8	4.1
Total		592	100.0

Note: Question #21 asked: “The following minor features can also help. Check all that are in your home”

Chapter 5. Discussion

At the time this researcher began this study, there was little investigation of baby boomers and their effort to age in place. Now that boomers are turning 65 and entering the retirement system in large numbers, more of this research may be instigated. To reiterate, the researcher hypothesized that boomers would be different from non-boomers, and the objective of this research was to answer the following research questions:

1. What are the demographic characteristics of baby boomers who proactively implemented home modifications to enable them to age in place?
2. What modifications did they make?
3. What are the demographic characteristics of baby boomers who proactively decided to relocate rather than modify their homes for aging in place?
4. What is the well-being of baby boomers who proactively decided to modify their homes or relocated for aging in place?

Limitations of the Study

Before discussing the research conclusions, it is important to address the limitations of the study. Due to the high level of education of the survey participants, the sample is not representative of the general population. The research questions focus on homeowners who are willing to fund and can afford home modifications. The subject characteristic of socioeconomic status is biased in that there were few participants in the lower-than-middle socioeconomic stratum with an annual income less than $50,000. However, the higher educated and higher income

population is also the one more able to afford hiring designers and architects. So these research results could remain of interest to industry professionals. The findings are generalizable only as based on this sample.

A second limitation of the study is the use of online anonymous surveys. There is the risk that participants would not be truthful, and there is no way to assure that anyone taking the survey was over age 50. However, 85 of the 225 participants filled in the open-ended question. Some of the comments were quite lengthy, and it seemed that respondents were passionate about the issues and wanted to contribute their input to the research. Mason & Suri (2012) cited a number of psychology research studies that validated the use of online survey data to show that the results were similar to paper and phone survey methods.

A third limitation of the analysis is that the researcher did not use age ranges that truly bracket baby boomers born in 1946 to 1964, which would be equivalent to ages 49 to 67. In order to make the survey question easy to read, the user was asked to self-identify with decade-wide age ranges of 50-64, 65-74, 75-84, and 84+. Thus the comparison of boomers to non-boomers based on 50-64 is not strictly accurate. Participants were asked to input their birth year, and except for two incidences, these corresponded with the selected age range.

Lastly, the value of this research is limited by the extent to which home modifications can contribute to the ability of people to age in place. Home modifications are only a piece of the puzzle. A barrier-free residence can

accommodate the increasing disability that accompanies aging and make it easier to receive home care services, perhaps eliminating the need to move to assisted living or a nursing home. But health, physical activity, emotional support, finances, and many other factors can detract from a person's ability to age in place (Safran-Norton, 2010). Implementing home modifications may help one to age in place, but it will not guarantee accomplishment of the goal.

Answers to the Research Questions

This section addresses each of the research questions and the failure to prove the hypothesis.

Home modifications may be occurring at a higher rate. Because the sample was homogeneous, the demographic characteristics of boomers making home modifications did not differ markedly from older cohorts in the study. There was a significant difference in the percentage of boomers making modifications as compared to non-boomers, but that could be expected based on the growing need to address housing issues as people age. However, the incidence of home modifications for the entire sample was double the 15% reported in the research literature (Fausset, Kelly, Rogers, & Fisk, 2011; Safran-Norton, 2010; Strohschein, 2002; Yuen & Carter, 2006). At 24%, even the boomers had higher than historical values. The open-ended responses indicated that the increase may partially be due to the fact that boomers have watched their parents struggle to age in place and are taking those lessons to their own homes. In some cases, boomers had made modifications

to their own homes specifically to house parents. Addressing those situations in the survey questions is a suggestion for future studies.

Independence is the strongest motivator for home modifications. A key finding of this research was the characterization of people's motivations for making home modifications. The data indicated that maintaining independence was the strongest motivator, followed by staying in the community, upgrading or beautifying the home, and being a good investment. The lowest motivator was declining health and ability. This implies a market positioning strategy for the designer or architect who is gently trying to persuade a client to implement universal design features into a home remodel. The data suggest that clients would be more receptive to features that contribute to continued independence and maintenance of the lifestyle status quo in their community, as opposed to features that are predominantly safety-oriented and a counter-balance to declining ability. Secondly, new home features should be positioned as real improvements that upgrade or beautify the home, and they should be an investment, not just an expense. The salient point of this research is that even when clients are predisposed towards aging in place, a designer must still address independence and life improvements rather than reminding the client to take action in order to face decline.

Relocation is not a popular solution. For relocation, there was no significant difference between boomers and non-boomers, and thus no demographic characteristics stood out. Only 12% of the sample had relocated to age in place. This

number makes sense, since staying in one's community is a strong motivator for remodeling the home. It also gives a forewarning to designers that there is a fairly small market for downsizing services. Given that community is a strong magnet, it could be inferred that for many people, relocating within the same community might be a happy solution. It would combine well with downsizing and living in a more sustainable footprint. However, a few respondents lamented the high cost of living in their area, and how financially difficult it would be to stay in the great communities in which they lived.

It was also interesting to note the possible antipathy towards relocating to be near adult children. Again, given the magnet of community, it would make more sense for aging parents to bring adult children back to the family home to help the parents age in place. The recent growing media interest in multi-generational homes has been attributed to a myriad of reasons including cultural or ethnic heritage, the recession, unemployment, boomerang kids, as well as helping aging parents. Attention to multi-generational homes could lead designers and architects to develop innovative solutions for older adults.

It's not necessary to take action (yet). As might be expected, 57.3% of the sample population felt that taking action at this time was not necessary. The oldest group felt even more strongly about this, and that is probably because they have committed to their homes "for the duration." In many of the open-ended comments, respondents acknowledged this was a problem they would have to address. Looking

at this from the opposite viewpoint, it could mean that there is a large untapped segment of boomers and non-boomers who will need aging in place services.

No conclusion on whether aging in place improves well-being. As in most health surveys ("Older Americans", 2012), subjects in this study self-reported as healthier than would be expected despite having chronic health conditions. In addition, only a small percentage reported being depressed. As a result, it was not possible to ascertain if taking action to age in place had improved participants' well-being.

Reject the Hypothesis

The hypothesis of this study was that there would be a difference between boomers and non-boomers. The results failed to indicate significant differences in attitudes towards aging in place or characteristics between the proactive planners in the two cohorts. An important finding, however, is that both cohorts are looking for the same values in home modifications.

It was also expected that proactive home modifications would have a positive correlation with good health, higher socioeconomic status, and having adult children far away (or not having any children). However, given the sample homogeneity, such analysis was not feasible. Another expectation was that relocation would be negatively correlated with those relationships, the size of homes, and the number of stories. Again, there were too few respondents for such analysis.

Implications for Designers and FCS Professionals

The FCS mission is to improve the quality of life of individuals, families, and communities. In this study, over half of the sample had not taken any action to ensure their homes would remain a good fit for their changing abilities. As FCS professionals, we can contribute to the greater good by educating and influencing more consumers and fellow housing professionals about the need to plan for aging in place.

One of the goals of this study was to learn from the 30% of the sample who had implemented home modifications. Designers should utilize the findings that the homeowners were motivated to maintain independence and stay in the community, but less than one-third thought it important to plan for declining health or ability. This could be interpreted to mean that consumers are motivated to maintain a lifestyle, but they are largely not enthusiastic about universal design.

A designer will need to be creative with clients to help them see how universal design should be as desirable and acceptable as the growing trend towards sustainability. The designer can then work to implement solutions that are aesthetic and improve the client's quality of life for as long as possible in the home. Designers should present alternatives and recommendations so that the client can weigh risks to lifestyle, benefits of being proactive in one's fifties or sixties, and likely outcomes. More designers and architects are adopting sustainability into their practices because it is environmentally correct and despite costing more up front, it can save money and resources in the future. In the same vein, features for aging in

place should also have a positive return, where the benefits could be in less caregiving expense and avoiding loss of independence. Successful aging depends on many factors, of which interiors are just one. Clients must apply their own strengths and resources to achieve aging in place, but FCS professionals can help guide the way.

Areas for Further Study

Suggestions for further study are to increase the diversity of the sample and utilize Amazon MTurk (see Appendix B). In addition, a paper survey could be administered with older populations such as senior center members. Some areas of the survey could be refined, such as improving wording and addressing aging in place issues of family members and even pets. There were also areas left unsaid. For example, the survey did not ask respondents to elaborate on why they wanted to stay in the community, but in the open-ended text entry fields, a few people mentioned the availability of services. Correlating aging in place motivations with aging services could be helpful to the geriatric industry and government planning.

Because the sample did not appear to have economic concerns about moving or remodeling, there was no analysis of the impact of financial issues on aging in place. Although only 12% of the sample relocated for aging in place, downsizing may be an important reason for moving; this attitude should be explored in more detail. The contribution of multi-generational homes to enable aging in place could be another fruitful research area. Not all data have been presented in this thesis, so

further analysis of survey questions related to social network relationships and the open-ended questions could deliver additional findings.

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Appendix A Survey Questions Developed for this Study

Q1 Thank you for your interest in this online consumer research study on baby boomers and home modifications. Please read and agree to the following consent form before proceeding. Implied Consent to Participate in Research Data collected from this confidential survey will be used for completion of a Master's degree in Family and Consumer Sciences at San Francisco State University. The information gathered will be used for research on Aging in Place, which is the goal of living in your home as long as possible. You have been invited to participate because you are over age 50 and an Internet user. You must be born before 1964 to participate. In addition, we are looking for people who have made modified their home, or who have relocated, in order to age in place. The survey questions will ask about your demographics, health, social support, attitudes, current home, and modifications you have done or reasons you relocated. There are no risks to you in participating in this study. You may choose to participate or not. You will need to answer all the questions, but you may stop at any time. If you do not wish to participate, you may simply close your web browser, with no penalty to yourself. If you do participate, completion of the survey indicates your consent to the above conditions. Please do not enter your name anywhere on the survey. The survey has up to 30 questions and should take approximately 10 minutes to complete. Any questions or concerns should be directed to the principal investigator, MJ Lee, at mjlee101@mail.sfsu.edu or the research advisor, Professor Gus Vouchilas, at gusv@sfsu.edu. You can learn more about the research at mjlee101.wix.com/mjlee101. Any questions or concerns should be directed to the principal investigator, MJ Lee, at mjlee101@mail.sfsu.edu or the research advisor, Professor Gus Vouchilas, at gusv@sfsu.edu. If you want to review the survey questions, they are posted on my website along with a link to a separate survey for testing purposes only.

Q2 I have read, understood, and printed a copy of, the above consent form and desire of my own free will to participate in this study.

- ❍ I consent
- ❍ I do not consent

Q3 To participate in this study, you must reside in the United States and be age 50 or over. Do you reside in the United States?

- ❍ Yes
- ❍ No

Q4 How old will you be as of December 31, 2013?

- ❍ under 50 years old
- ❍ 50-64 years old
- ❍ 65-74 years old

- ❍ 75-84 years old
- ❍ 85 or over

Q5 What is your gender?
- ❍ Male
- ❍ Female

Q6 Aging in Place means living in your home as long as possible. In order to make your aging easier or safer, have you made modifications to your home or have you relocated to a different residence to age in place? Examples of home modifications: Have you installed grab bars or handheld shower heads? Have you made your home accessible to wheelchairs, removed the threshold at the front door, or converted a shower to curbless? These are just examples; there are many other possibilities. -
- ❍ Yes, I modified my home to age in place
- ❍ Yes, I moved to my current home to age in place
- ❍ No, I have not made any changes

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Q7 How much do you agree with the following statement: What I'd really like to do is stay in my current home as long as possible. .
- ❍ Strongly Agree
- ❍ Agree
- ❍ Neither Agree nor Disagree
- ❍ Disagree
- ❍ Strongly Disagree

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Q8 Does your community have these age-friendly qualities? Check all that apply:
- ❑ Easy access to public transportation
- ❑ Safety
- ❑ Shopping
- ❑ Walkability
- ❑ In-home caregivers are easy to obtain
- ❑ Opportunities for social connectedness
- ❑ Opportunities for employment
- ❑ Opportunities for volunteerism
- ❑ Opportunities for mental or physical stimulation

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Q9 You indicated that you modified your current home to help you age in place. What were your primary reasons for taking action?

	Importance in Taking Action				
	Not Important	Neutral	Somewhat Important	Important	A Deciding Factor
Stay independent	❍	❍	❍	❍	❍
Stay in my community	❍	❍	❍	❍	❍
Upgrade or beautify the home	❍	❍	❍	❍	❍
Good investment	❍	❍	❍	❍	❍
Declining health or ability	❍	❍	❍	❍	❍
Cannot afford to move	❍	❍	❍	❍	❍
Other (please explain)	❍	❍	❍	❍	❍

Q10 You indicated that you moved into your current home to age in place. What were your primary reasons for moving?

	Importance in Moving				
	Not Important	Neutral	Somewhat Important	Important	A Deciding Factor
Move closer to adult children	❍	❍	❍	❍	❍
Upgrade to a better home	❍	❍	❍	❍	❍
Move to a better community	❍	❍	❍	❍	❍
Economic reasons	❍	❍	❍	❍	❍
Declining health or ability	❍	❍	❍	❍	❍
Difficulty maintaining home	❍	❍	❍	❍	❍
Other (please explain)	❍	❍	❍	❍	❍

Q11 You indicated that you have not made any changes. What are your primary reasons for not taking action?

	How much do you agree with the reason?				
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Do not feel it is necessary	❍	❍	❍	❍	❍
Economic reasons	❍	❍	❍	❍	❍
Am still in planning mode	❍	❍	❍	❍	❍
Have not had time	❍	❍	❍	❍	❍
Will probably move	❍	❍	❍	❍	❍
Other (please explain)	❍	❍	❍	❍	❍

Q12 What is your zip code? (This question is optional. Leave it blank if you would rather not say.)

Q13 How long have you lived in your home?
- ❍ Less than 1 year
- ❍ 1-5 years
- ❍ 6-10 years
- ❍ 11-20 years
- ❍ More than 20 years

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Q14 Including yourself, how many people live in your household?
- ❍ 1 person
- ❍ 2 people
- ❍ 3 people
- ❍ 4 or more people

Q15 What type of housing do you live in?
- ❍ Single-family residence
- ❍ Condominium or townhouse
- ❍ Multi-unit building such as a duplex, triplex, or apartment building
- ❍ Multi-unit building for senior housing, assisted living, group home, or nursing home
- ❍ Mobile home

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Q16 Is your living area all on one level, or is it multi-story?
- ❍ All on one level
- ❍ Two or more stories, or split-level

Q17 What is the square footage of your home?
- ❍ Less than 1,000 sq ft
- ❍ 1,000 - 2,499 sq ft
- ❍ 2,500 - 3,499 sq ft
- ❍ More than 3,500 sq ft

Q18 Do you have a mortgage on your home?
- ❍ Yes, I have a mortgage
- ❍ No, I own my home with no mortgage
- ❍ No, I pay rent or do not pay for housing

Q19 If you could guess, your home comprises what percentage of your net worth?
- ❍ Less than 25%
- ❍ Less than 50%
- ❍ More than 50%
- ❍ I have no idea
- ❍ I would rather not say

Q20 The following features in a home can help as one ages. Check all that are in your home and living area:
- ❑ A bedroom (or a room that could be used as one) on the main level of the residence
- ❑ A full bath (sink, toilet, and bath tub or shower) on the main level
- ❑ Wide doors that easily accommodate a wheelchair
- ❑ Wide hallways that easily accommodate a wheelchair
- ❑ A roll-in or curbless shower
- ❑ An entrance without steps
- ❑ A zero-threshold entrance
- ❑ An elevator, stair, or platform lift
- ❑ Non-slip flooring (e.g., linoleum, rubber, or cork) in wet areas

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Q21 The following minor features can also help. Check all that are in your home:
- ❑ Lever door handles
- ❑ Hand rail at steps or in hallway
- ❑ Grab bars anywhere in the home
- ❑ Shower seat
- ❑ Hand-held shower head

- ❑ Single-lever faucet
- ❑ Touchless faucet
- ❑ Higher toilet seat (17-19" versus 14-15")
- ❑ Washlet or electric toilet seat

Q22 How do you rate your health?

- ❍ Excellent - I only visit the doctor for checkups
- ❍ Very good - I have no significant chronic problems
- ❍ Good - I have some chronic problems that I control on my own
- ❍ Fair - I have a home health aide or receive home health services such as nursing
- ❍ Poor - I have been hospitalized in the last year for a chronic condition

Q23 Do you have any of these chronic conditions? Check all that apply.

- ❑ Uncorrectable vision problems
- ❑ Heart disease
- ❑ Diabetes
- ❑ Limited mobility such as walker or wheelchair-dependent
- ❑ Stroke or CVA (cerebrovascular accident)
- ❑ Oxygen-dependent COPD (chronic obstructive pulmonary disease)
- ❑ Dementia

Q24 How many children, relatives or friends do you feel very close to?

- ❍ None
- ❍ 1-2 children, relatives, or friends
- ❍ 3-5 children, relatives, or friends
- ❍ More than 5 children, relatives, or friends

Q25 Characterize the children, relatives, or friends with whom you feel very close. Check all that apply.

Children	❑ Do you help them?	❑ Do they help you?	❑ Are they nearby?
Other relatives	❑ Do you help them?	❑ Do they help you?	❑ Are they nearby?
Friends	❑ Do you help them?	❑ Do they help you?	❑ Are they nearby?

Q26 Do you often feel depressed? (All answers are anonymous and confidential.)

- ❍ Yes
- ❍ No
- ❍ I would rather not say

Q27 In what year were you born?

Q28 What is your current marital status?
- ❍ Single, Divorced, or Separated
- ❍ Married or living with a significant other
- ❍ Widowed

Q29 What is your race?
- ❑ White/Caucasian
- ❑ African American
- ❑ Hispanic
- ❑ Asian
- ❑ Native American
- ❑ Pacific Islander
- ❑ Other

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Q30 What is the highest level of education you have completed?
- ❍ Grammar or Middle School
- ❍ High School or equivalent
- ❍ Some College
- ❍ College Graduate (4 year)
- ❍ Masters Degree (MA, MBA, MS, etc.)
- ❍ Doctoral or Professional Degree (PhD, MD, JD, etc.)

Q31 What is your current annual household income, in U.S. dollars? (All answers are anonymous and confidential.)
- ❍ Under $20,000
- ❍ $20,000 - $49,999
- ❍ $50,000 - $74,999
- ❍ $75,000 - $99,999
- ❍ $100,000 - $150,000
- ❍ Over $150,000
- ❍ I would rather not say

Q32 How did you find out about this study? Check all that apply.
- ❑ Followed a link from another Web page
- ❑ Found using a search engine
- ❑ Saw posting in a newsgroup or forum
- ❑ Was told the URL by a friend
- ❑ Was told the URL by an interior designer or architect
- ❑ Heard about the study at a senior center (please specify the senior center)

  _____

Q33 Would you like to share any comments about your efforts to age in place?

Q34 Browser Meta Info

- Browser
- Version
- Operating System
- Screen Resolution
- Flash Version
- Java Support
- User Agent

Appendix B Sample Recruitment

At the outset, the researcher felt that it would be very difficult to find boomer participants, and that the research might fail for lack of survey subjects. Yet this was not the case. The power of the Internet was used to broadcast and promote the survey. In addition, media people (bloggers and journalists) found the researcher's portfolio website and survey on their own. Following are examples of recruitment emails and postings in online forums.

Sample recruitment email.

Hello XXX,
I am a master's candidate at San Francisco State University and am conducting an anonymous 10-minute online survey on consumer decision making about Aging in Place.

I am looking for survey participants who are over 50, live in the US, and want to age in place. Could you help spread the word on my survey at http://tinyurl.com/powdfda?

Thank you very much for your time,
-MJ Lee
http://mjlee101.wix.com/mjlee101

Sample forum posting.

Hi HomeModifications-List members,
I know some of you are active in the aging in place space. I hope you can help spread the word about my online survey.

I am a graduate student at San Francisco State University. My research goal is to understand consumer decision making on remodeling for aging in place.
I am looking for survey participants who are over 50, live in the US, and have made changes or relocated in order to stay in their homes for the rest of their lives. This anonymous survey takes less than 10 minutes to complete.
http://tinyurl.com/powdfda

Thank you very much for your time,
-MJ Lee
http://mjlee101.wix.com/mjlee101

Facebook post.

Figure B1 is a screen capture of a post on the Aging2.0 Facebook page. For

Figure B1. Aging2.0 posted a catchy link to the survey on their Facebook page. This brought participants to the portfolio website, including a masters candidate in architecture at Cal Poly San Luis Obispo. This allowed the exchange of ideas about senior and intergenerational housing design.

some sites, the researcher wrote a short essay for inclusion on the site's blog. Survey recruitment emails were sent to the following organizations or announcements were posted in their forums. Some organizations did not respond to the emails.

- AARP Bulletin (no response)
- AIA-SF Design for Aging committee
- American Society on Aging AgeBlog

- ASID-CA Peninsula
- Avenidas Village
- CCIDC (no response)
- Positive Aging Forum (no response)
- Cupertino Senior Center (no response)
- Homemodifications-list
- Mountain View Cohousing
- Oshman Jewish Community Center (no response)
- NY Times Booming (no response)
- Palo Alto Crescent Park forum
- PAMF Linkages Bay Area Timebank
- PVForum
- RachelAdelson.com (Huffington Post did not publish the interview)
- Santa Clara Senior Center (no response)
- SilverPlanet.com
- TechEnhancedLife.com
- Televisit.org
- Baby Boomers club at The Villages in Florida (no response)
- WhiteHair365.com Sage Celebration

MTurk: A Recruitment Method that was not Exercised

A planned recruitment method was to solicit subjects through Amazon's Mechanical Turk system (MTurk), paying qualified participants a fee of less than 50 cents through Amazon's own payment system. MTurk has been shown to be an effective survey recruitment tool in psychological studies (Buhrmester, Kwang, & Gosling, 2011; Donnelly, Iyer, & Howell, 2012; Mason & Suri, 2012). However, this method was not utilized during the study, as response rates exceeded expectations such that MTurk was deemed unnecessary. In addition, integrating MTurk required programming within the Qualtrics survey along with testing of the Qualtrics-MTurk interface.

Appendix C Survey Design and Constraints

This appendix describes some of the survey design steps that were taken within the Qualtrics software.

Survey Ballot-Stuffing

Qualtrics can enforce that a survey participant may only take the survey one time per browser, by storing a cookie with that browser. A user would then have to switch to multiple browsers in order to take the survey duplicate times (known as ballot-stuffing), or else repeatedly clear browser cookies. During testing, the survey design option to enforce single usage caused technical issues for a significant percentage of users, who accidentally clicked the wrong answer (e.g., did not live in the United States) and then were terminated from the survey. Once they were terminated, it became a support issue for the researcher to help them retake the survey. Thus, it was decided not to enforce single usage, as it seemed logical to err on the side of accepting all qualified participants, rather than try to rule out the few who might abuse the survey. As a fall back, the IP addresses for the survey responses were checked for duplicates. However, the few such duplicates appeared to be legitimate (they were of average survey duration with varied answers) and a result of multiple people using the same computer.

Subject Mortality and Survey Flow

The survey logic flow was configured such that three qualifying questions were initially asked. If the respondent self-reported as less than 50 years old, did

not live in the United States, or did not agree to the implied consent form, the survey was terminated.

As described by Fraenkel, Wallen, & Hyun (2012), subject mortality is one of the threats to the internal validity of any research study. With a 30-question survey, there was concern that if the survey took too long to complete, it could lead to subject fatigue and early survey termination. To streamline the survey and minimize fatigue, survey logic flow was implemented. Decision branching was dependent on the respondent's answers, allowing irrelevant questions to be skipped.

As a result, survey logic flow varied the total number of questions by up to two questions. For example, in question 18, if a subject indicated that he/she paid rent or lived rent-free, the survey logic skipped the following question that would have asked how much the home contributed to total net worth. Secondly, in question 24, if a subject indicated that they did not feel close to anyone, they were not presented with question 25, which asked them to characterize those relationships. The survey logic for question 25 is shown in Figure C1. This approach helped keep survey duration to approximately 10 minutes or less.

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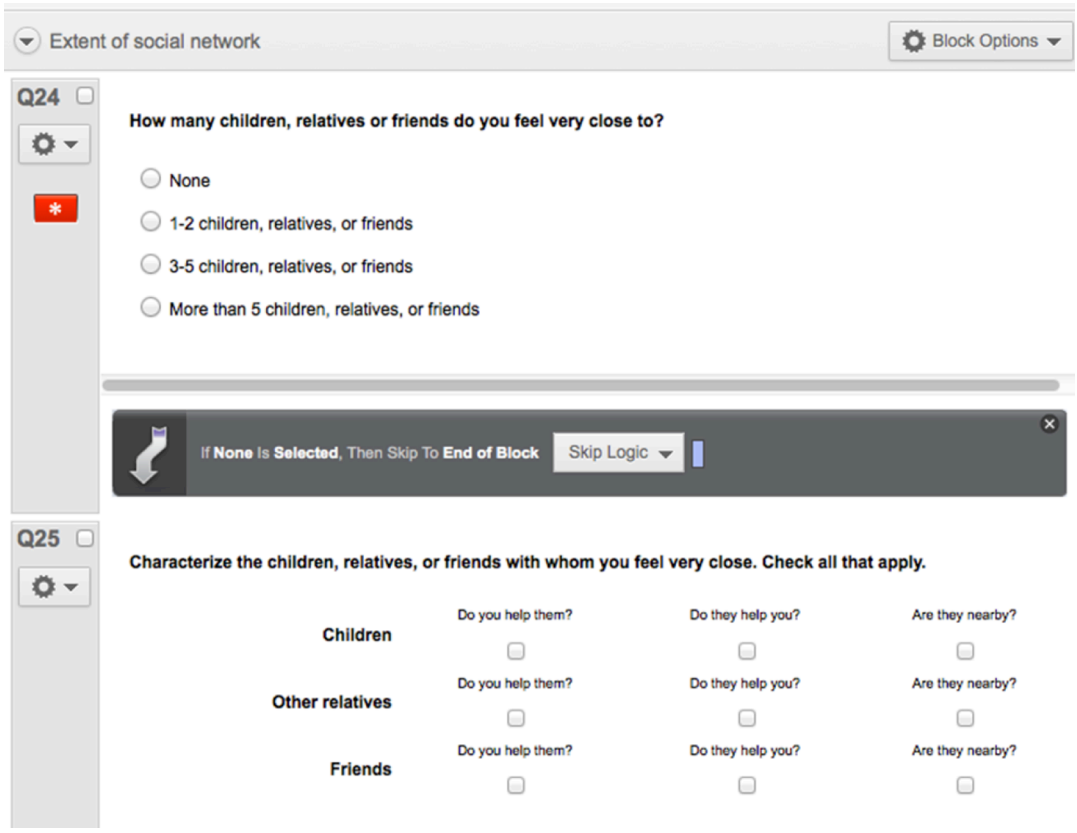

Figure C1. A screen shot of the Qualtrics survey flow logic. This feature controlled which questions were displayed to a user based on prior responses. In this example, Question #25 was skipped if the respondent selected “None” in response to Question #24 “How many children, relatives or friends do you feel very close to?”