

HOME BUILDER'S ATTITUDES AND KNOWLEDGE  
OF AGING: THE RELATIONSHIP TO DESIGN  
FOR INDEPENDENT LIVING

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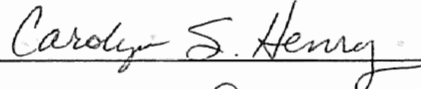
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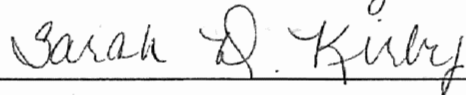
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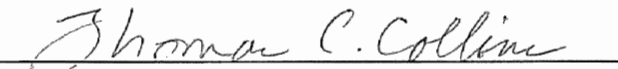
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## CHAPTER I

### INTRODUCTION

The average age of the American population is increasing. The most rapid increase will be between the years 2010 and 2030 when the baby boomers reach 65 years of age. By 2025 the percentage of the elderly population is projected to rise from the present 12.5% to 23.6% (Null, 1989; Wall, 1986). Today, one out of every ten Americans is over 65 years old, with the fastest growing portion of this group being age 85 years and older. Life expectancy in the United States today is 73 years for males and 79.6 years for females. With advancements in technology and medicine this trend is expected to continue (American Association of Retired Persons [AARP], 1990b; Barrow, 1992.).

The nation is facing the difficult task of how to economically support, house and provide health care to an ever increasing population of older adults (Hoglund, 1983). Currently, we have outdated forms of health care and housing that will not meet future needs. The increase in the proportion of older people in the population has generated concern about their ability to function and live independently. The sheer numbers of the elderly will make traditional forms of institutional care, such as nursing homes, boarding homes and psychiatric hospitals, virtually impossible (Null, 1989).



Developmental and physiological changes that occur with age have an impact on the ability of older people to function in the community and carry out activities of daily living (Czaja, 1988). The environment in which one lives can aid or hinder these basic tasks such as dressing, bathing and eating. Researchers have recognized that design of the physical environment plays a major role in the ability of an elderly person to continue to perform daily tasks and thereby to continue to live independently. The ability to carry out daily activities such as meal preparation, bathing and cleaning is a major factor in the families or health professionals assessment of an older person's ability to function independently. Results from such assessments play a role in recommending continued independence versus institutionalization (Altman, Lawton & Wohlwill, 1984).

Institutionalization is costly in human and economic terms. In human terms, the majority of elderly people value their independence and prefer to age in their own homes (Shapiro & Tate, 1988). "Aging in place" allows people to continue to enjoy privacy, independence and be in control of their lives and maintain the comfort and familiarity of the home and neighborhood in which they live. It has been documented that the environment in which people live can contribute to their emotional health and well being (Andreasen, 1985; Lawton, 1989). This is especially true for home environments of the elderly because the amount of discretionary time spent inside the home increases with age; up to 80-90% of their time each day is spent in their homes (AARP, 1990b; Czaja, 1988).

In terms of economics, the proportion of the elderly population increases, the problem of institutionalization and its cost may assume even greater importance (Kahana, 1974). The national average for skilled and intermediate nursing home care ranges from \$1,400 to \$2,000 per month (National Center for Health Statistics, [NCHS], 1991). Therefore, aging at home will become an increasingly viable solution. Families as well as builders and other housing professionals would benefit from understanding the advantages of home designs that allow individuals to remain living independently for the maximum period of time. Residential environments that are accessible and functional for all people without regard to age, ability or physical limitations can aid in life-long tenancy. By routinely incorporating universal design features which offer support, are adaptable, accessible, and provide for life safety, a total life-span environment can be economically achieved (Beitz, Kirby, & Brewer, 1992).

#### Statement of the Problem

With the continuing increase in the elderly population it is apparent that the current housing options will not be able to meet their physiological and sociological needs. This dilemma heightens the chance of premature institutionalization which can be an economic and psychological burden for most individuals, their families and society as a whole. Research has shown that elderly people prefer to stay in their own homes as they age. If they cannot

adapt to their existing environment they are often placed in an institution that will "take care of them". Approximately 25% of all people over 65 will spend some time in a nursing home at some point during their later life (Kastenbaum & Candy, 1973; Hooyman & Kiyak, 1993). A vast majority of elderly want to take care of themselves and maintain their independence (Vaughn, 1981).

If the home environment is to support this desire for control and independence then it must be flexible and adaptable to the changing needs and increasing demands of the elderly. Proper design can reduce the stresses associated with a decline in physical functioning and may lessen the incidence of withdrawal from activities, premature institutionalization, accidents and fatal injuries (Redfoot & Gaberlavage, 1991; Pynoos & Regnier, 1987).

There are a variety of universal design methods and features on the market today that can be incorporated into new and existing houses to increase the independence of the elderly thereby enabling them to remain at home longer. However, professional builders use standard design and building practices that typically do not incorporate independent living features. Reluctance to utilize new ideas may be attributed to traditional values and conformity to conventional building practices. In addition, the consumers inability to evaluate the impact of housing features on their lives may also be a barrier in providing supportive residential environments.

The current housing design standards do not reflect an understanding of the changing needs and capabilities of people as

they age or become temporarily disabled. The research in this study will give insight into how the problem can be addressed and improved.

#### Purpose of the Study

The purpose of this study was to provide a better understanding of the factors that affect current design and construction practices which do not typically facilitate life-long use of single family homes. A survey was conducted among Oklahoma home builders to measure their attitude and awareness of the aging process and its relative effect on the design of residential environments. The level of awareness of current building products and design features that promote independence was also measured. Although it was not a direct part of this study it is hoped that the home builders who took part in the survey will become more aware of the aging process across the life span and its implications for design. It is also hoped that the issues touched upon by this study might strengthen long-term policy development of general housing needs of an aging population.

#### Conceptual Framework

##### Eco-Systems Model

Environment and behavior are closely intertwined. Person-environment relations are best viewed as an ecological system, that takes into account the impact the environment has on an individual

and the impact the individual has on the environment (Altman, 1975). A person is part of the total ecological system and cannot be separated from the environment. By making appropriate adjustments to the environment, it is possible to maximize the adaptive and effective behavior of older persons (Anderson, 1984).

The concept of environmental impact on human behavior has been used in many disciplines for over half a century. The first psychologist to refer to person-environment interaction was Lewin (cited in Lawton, 1986), who stated "behavior is a function of both person and the environment" which translates to the ecological equation  $B=f(P,E)$ . A change in either the person or the environment produces a change in behavior.

The earliest framework for a person-congruence model was Murray's theory of personality (1938) which he termed "personology". This theory posits that individuals are in dynamic interaction with their setting; they attempt to maintain equilibrium as the environment changes. Murray's theory, and other more recent theories of person-environment congruence (Kahana, 1984) maintain that the individual experiences optimal well-being when his or her needs are in equilibrium with the environment.

Gerontologists began to consider the impact of the environment on the aging population somewhat later. The gerontologists realized that as a person ages the range of adaptive behavior may narrow in stressful environments because of changes in physical, social and psychological functioning (Hooyman & Kiyak, 1988, 1993). From a sociological perspective, Gubrium (1973) suggests that both the

social and physical environment influence the activities of older people. This socio-environmental theory looked at age homogeneity and physical proximity of people in their living environments.

Kahana's theory of person-environment (P-E) fit (1974) was the first congruence model to be tested on the elderly. According to Kahana, incongruence between individual needs and environmental press produces stress, which requires adaptation. This stress is likely to effect the older person's well-being, especially if cognitive and functional abilities are impaired.

This study will use the person-environment transaction theory or the competence model proposed by Lawton and Nahemow (1973). This particular model is useful because of the clarity of its dimensions and applicability to design decision making (Pollack & Newcomer, 1986). The basic premise of the model is that behavior and satisfaction are contingent upon the dynamic balance between the demand of the environment, (i.e., press), and the individuals abilities to deal with that environmental demand (i.e., competence). The press can be positive, negative or neutral, and can be in the physical or social environment. Competence is defined as the upper limit of the ability to perform tasks in areas such as life maintenance, physical self-maintenance and functional health. When competence and press are in balance, the resulting behavior is adaptive and the individual is satisfied. When competence and press are not congruent, the result is mal-adaptive behavior and dissatisfaction.

As an individual ages, age-associated changes contribute to a lower level of competence. The individual becomes increasingly susceptible to changes in environmental press. In order to maintain the dynamic balance, individuals have to either improve their environmental conditions (i.e., press), increase their level of competence or move to another environment. The person-environment theory supports the emphasis of this study; enabling people to remain in their own homes longer with the aid of appropriately designed environments. Simple physical environmental modifications in new and existing homes such as handrails, wider doorways, lowered cupboards and countertops and ramps can help raise the adaption level and daily coping ability of the older adult (Hooyman & Kiyak, 1988, 1993).

#### Objectives

The objectives of this study were:

1. to determine the builders' level of knowledge of aging and to determine the builders' attitude toward aging.
2. to determine the builders' awareness level and use of accessible products and features.
3. to determine whether awareness of accessible features results in their actual use in residential design.
4. to determine if knowledge and attitude of aging have an effect on the awareness or use of accessible features in residential design.

### Research Questions

1. Do home builders have knowledge of facts on aging?
2. Do home builders' have a negative or positive attitude of aging?
3. Does a home builders' knowledge of facts on aging, and attitude about aging relate to the awareness and use of accessible products and features for residential design?
4. Are home builders aware of accessible products and features and do they use them in residential construction?
5. How do knowledge, attitude, gender, age, years in practice, education and occupation affect use and awareness of accessible features in residential construction.

### Definition of Terms

Elderly - Any individual age 65 or older.

Home builder - A licensed builder, contractor or architect.

Accessibility - Standard design elements and features that do not interfere with or inhibit activities of daily living for those with disabilities.

Consumer - A person who is buying a home.

Universal design - features that make an environment more useable, convenient and accessible for people ranging from small children to wheelchair users.



### Assumptions

The following assumptions are included in this study:

1. Respondents answered the self-administered questionnaire truthfully and accurately.
2. The instrument used accurately measures knowledge and attitudes of aging, and awareness and use of accessible products and features.

### Limitations

1. The use of the Oklahoma Home Builders Association membership list may limit the ability to generalize the findings of the study to home builders in other areas of the country because of regional characteristics.
2. The range of FAQ II scores did not vary enough to allow adequate comparison between individual scores or with other variables.
3. Palmore's FAQ II has been traditionally used in a college setting and with health professionals. To use the instruments with home builders may not give a true representation of their knowledge and attitude toward aging.

### Summary

With life expectancy increasing and the proportion of the elderly population growing, it is clear that the current forms of health care and housing will be strained, if not largely inadequate, in the coming years. Designing homes that incorporate

universal design principals can aid in long term comfort, safety, and ease of use, thus deferring institutionalization indefinitely. However, current home building industry practices do not reflect an awareness of the problems associated with elderly people continuing to live independently in their own homes.

Age related changes may have a negative impact on the way elderly people interact with their environment. When a person is limited in mobility or perceptual ability, the environment plays an increasingly prominent role in their ability to remain independent. Independence and control are valuable commodities that become increasingly important as an individual ages. The desire of so many elderly to "age in place" is a function of wanting to remain independent and in control of their lives for as long as possible.

## CHAPTER II

### REVIEW OF LITERATURE

#### Introduction

The body of empirical and theoretical literature regarding living environments for the elderly is growing as quickly as the elderly population itself. Planned housing and institutions constitute only a small portion of residential settings where older people live. The actual proportion of older persons permanently living in institutions is around five percent (AARP, 1992). There is now a concern of how older people will deal with their existing housing in ordinary neighborhoods (Lawton & Hoover, 1981; Struyk, 1977).

Individuals must make a series of decisions about their environment as they age, remaining in place is by far the most frequent decision made by older people. Current building practices do not promote the concept of "aging in place". There are many simple design practices that can be implemented to encourage independence and autonomy for people of all ages; however, they are seldom used (Gunn, 1988).

Consumer demand for accessible housing has not yet made much of an impact in the housing market. There is a certain stigma attached to the idea of growing older, and people often avoid the topic. Successful marketing strategies that promote accessible design as

"normal" are greatly needed. Adaptable housing that will change with the changing needs of an individual is warranted.

The development of a new approach to housing must begin with an understanding of what it means to grow old in our society. Aging is a universal and normal process that brings with it change in the structure and function of the human body. It is these changes that must be accommodated through changes in the living environment.

#### Health and Independence

The life cycle is a process of biological, psychological and social change which requires constant adaption by individuals and the environments in which they live (Hoglund, 1983; Lawton, 1989). The change occurs at different rates for different people, which makes chronological age a poor indicator of physical age and change (Salmon, 1963; Gunn, 1988; Ferrini & Ferrini, 1989). There are individuals in all age groups who experience some disability or impairment.

Some of the physical changes associated with the elderly can have an affect on living independently if the environment is not supportive. Structural changes in the nervous system can affect motor ability and reduce coordination, movement, reflexes and reaction time. Research indicates that elderly people lose muscular strength and muscle mass with age. Low levels of activity can cause muscular atrophy and shortened tendons, often leading to the need of prosthetic devices like walkers and canes (Ferrini & Ferrini, 1989). Shuffling feet or using prosthetic devices reduce speed and balance

which increase the chance of accidents. In addition, poor muscle control can make balance difficult. Slippery floor surfaces or raised thresholds may become hazardous obstacles.

There is a decrease in bone strength and mass with advanced age. The body's stature and posture may change due to compression of vertebral discs in the spinal column. Joints can become less flexible and may affect posture and position of the wrists and elbows. Rising bending, turning and kneeling can become difficult without the aid of grab bars or other support. Low shelves and electrical outlets may become impossible to reach. Arthritic conditions, which are common in the elderly, limit strength, dexterity and grasping, pinching and twisting motions. Door and window hardware can become difficult if not impossible to operate (Ferrini & Ferrini, 1989; NAHB, 1991; A.I.A., 1987).

With age structural changes occur in the eye which effect visual acuity, depth perception and color intensity. Changes in floor levels and in wall planes can become difficult to discern. Older people may require up to two times as much light as younger people to achieve equal visual acuity. Glare and abrupt changes in light levels can cause temporary blindness (Ferrini & Ferrini, 1989). The muscles that support the eye change with age which reduces the range of upward gaze and may cause problems seeing things on high shelves. Pain and touch receptors become less sensitive with age. Changes in textures may not be discernable, thereby reducing environmental clues. Decreased sensitivity to temperature changes may contribute to scalds, burns or hypothermia

if anti-scald devices and sensitive HVAC systems are not used (Hooyman & Kiyak, 1988).

For most of the population, the aging process does lead to a gradual decline in functioning and an increase in dependence, due to changes in vision, hearing, mobility, agility, strength, endurance and dexterity. However, increased dependence should not necessarily mean a loss of independence (Hoglund, 1983). Physical environments can be designed or modified to accommodate these changes (Hartford Insurance Group, [HIG], 1990). The built environment can help maximize the control older people have over their surroundings and reduce their sense of helplessness (Christenson, 1990).

Losing their independence due to health reasons is a fear that many older adults have. Independence and the ability to control one's environment have been found to be powerful variables in human behavior. Enhanced control has been related to enhanced self-esteem. Identifying ways to maintain control is essential to the well being of the elderly (Barques, Waxman, & Yaffe, 1988).

#### The Meaning of Home

The home has special significance for older persons; it is a meaningful expression of their personal and social self (Michelson, 1977; Cooper-Marcus, 1974). In addition to its material importance, the home holds much emotional significance (Dangelis & Fengler, 1990). Researchers have observed that an older person's home represents a reservoir of family history and memorabilia

(Csikszentmihalyi & Rochberg-Halton, 1981). Remaining in the family home perpetuates a sense of tradition and preserves self-esteem (O'Bryant, 1983). To be forced to leave this familiar and secure environment means losing memories, independence and control.

Secure environments may be tied to economic issues. Of the ninety-five percent of American elders who live in non-institutional settings, seventy-five percent own the dwelling in which they live (AARP, 1990b; Callahan, 1992). Since most elderly home owners have paid off their mortgage, the home is also a great economic asset (Danigelis & Fengler, 1990). In a recent AARP survey of consumer preferences, concerns and needs, a significant finding was that the preference for aging-in-place is prevalent among older people. Eighty-six percent said they wanted to stay in their present home and never move (AARP, 1990b).

Gerontologists have shown particular interest in how much the elderly's morale or life satisfaction is influenced by their residential environment. Residential well being is closely related to psychological well being (Lawton, 1989). Research has shown that the elderly spend eighty to ninety percent of their day at home (AARP, 1990b; Gabb, Lodel, & Combs, 1991). The home environment is a physical setting for life's events, as well as the container for an individual's hopes and dreams (Hoglund, 1983).

#### Current Practices

Traditionally, individuals have had to adapt in order to "fit" an environment, instead of adapting the environment to "fit" the

individual (Null, 1989). Much of the information that exists on making the home environment more safe and comfortable for the elderly suggests that the individual manipulate the environment in some way, instead of the environment adjusting to fit the individual (Brent & Brent, 1987). Most older people live in standard, conventionally built, single-family detached dwellings that were built prior to 1950 (AARP, 1990a). The market for these houses is generally targeted at people in the 30-55 year old age range. This housing type has been described as "Peter Pan" housing. The name conveys the concept that the housing was designed for people who will never grow old (Hare, 1992). Living spaces have long been designed for use by one "average" physical type, the young, fit, adult male (Pastalan, 1988). The majority of standards and design practices in use prior to the 1950's have continued into the 1990's and do not respond to the needs and requirements of a large segment of the population. This is true not only for standard "spec" housing but also for custom built homes. Research indicates that the elderly make very few alterations to their living environments, therefore they may live in places not suitable for their needs (Beitz, Kirby & Brewer, 1992; Brent, Lower-Walker, & Twaddell, 1983).

Historically, home builders have not seen the environment as part of a support system in assessing or responding to an individual's needs, and seldom recommend that changes in standards be made (Hiatt, 1984). Instead, builders focus on the tangible features of a home, such as the bricks and mortar and the visual



aesthetics. They have very little concern the about interaction between the environment and the person (Hoglund, 1983).

Although most home builders seem to understand that the environment has an effect on the user, few give this much consideration when designing (Gabb et al, 1991). In a study by Reizenstein (1975), most of the designers surveyed were aware of environment and behavior research and believed that the environment influences behavior. However, few of the designers had ever used the research findings in their work. They did not incorporate the findings because the findings were not readily available or were written in "jargon-like" language, and the implications for design were not immediately obvious.

Sommer (1974) identifies several explanations for the reluctance of professionals to pay attention to the values and needs of the occupants. He suggests that rather than trying to accommodate the varied needs of different types of users, it is easier for builders to assume that everyone has similar needs and tastes. Home builders are often supplier oriented and are most interested in persuading users to accept the designs they want to supply (Gabb et al, 1991). Historically, society has underestimated the need for housing that encourages independent living. Society has been too protective and has promoted helplessness rather than independence (Gunn, 1988). This phenomenon can be seen in the reluctance of the building industry to design houses that promote independence and may defer institutionalization. A goal of home builders should be to "normalize" housing and incorporate new

standards to make safer and more convenient housing for people of all ages.

For all individuals, habits and values are slow to change; there is no exception concerning the use of conventional building practices. Many home builders build according to building paradigms. Paradigms are a set of rules and regulations that describe boundaries, and how to succeed within those boundaries. Paradigms are common and functional in that they allow one to make sense of the surrounding world (Barker, 1992). However, these building paradigms for residential construction are based on tradition and builders are often unwilling to part from tradition long enough to see another way of doing things. This phenomenon has been referred to as paradigm paralysis, or a terminal disease of certainty.

A drawback of paradigms is that information that does not agree with the paradigm will not be addressed, the information is essentially screened out. Based on paradigms, a builder may continue to specify and install a 24 inch wide bathroom door even though a 36 inch wide door would be more functional and meet the client's needs better. In order to change the current industry standards, home builders need to understand their present building paradigms and move on to new ones based on real needs rather than tradition.

How builders design and build homes is a product of their paradigms as well as of the procedure society has established for producing buildings. One weakness in the process is the lack of a feedback phase. The omission of this phase results in a bias, and

gives little attention to the changing needs of the clients. An older person's feedback may prove useful during the design but this approach is seldom used. Instead, the designers use their own experiences as the basis for designing residential settings for older people (Brennan, Moos, & Lemke, 1988; Altman et al., 1984).

#### Alternative Practice

One of the most significant ideas that has been developed to meet the needs of the elderly is the concept of universal design. The basis for this idea is that design can meet the needs of all people, without regard to age, allowing them to achieve some balance of dependence and independence despite permanent or temporary disabilities (Null, 1989; McLeister, 1989; Hoglund, 1983, Mace, Hardie, & Place 1990). During the course of their lives most people will need, at least temporarily, a supportive environment similar to that needed by the elderly (Gunn, 1988). Universal design features fit these needs since they offer support, they are adaptable, accessible and they provide life safety (Raschko, 1987). Examples of universal design features include, but are not limited to, the following: package shelves at entries, level thresholds, wide door openings, wide hallways, lever handled faucets and door hardware, ground level entry, low pile carpet, non-skid floors, adjustable counter heights, anti-scald devices, reinforced walls of grab bars, shower or tub with built in seating.

Universal design has received support and its use in construction promoted and encouraged by the United States Department

of Housing and Urban Development (HUD) and The American Society of Interior Designers (ASID) (HUD, 1988).

The Fair Housing Act of 1988 incorporates the principles of universal design. However, the law only applies to residential buildings containing over four units. Smaller buildings and single family homes are exempt from the law (Pynoos, 1992). Demographic trends in the United States today will increase the need for single family housing that will meet the needs of people of all ages and various disabilities (Gunn, 1988; Lueck, 1987). Expanding the Fair Housing Act to cover single family homes would be a positive step toward a nation wide movement to promote universally designed housing. Many problems that existing homes present for "aging in place" would be eliminated if supportive, adaptable and accessible housing were built to begin with.

Since there is a significant preference among older people to remain independent and "age in place", housing that is designed with physical, sensory, social and psychological supports can help facilitate this desire (Christenson, 1990). The "smart house" technology that is now reaching the market is invaluable in maintaining independence at home. Several basic attributes of the smart house have implications for older persons, such as : reducing the incidence of electric shock, gas and electrical fires, and accidents with appliances and water temperatures (Gaskie, 1988). The smart house is designed to anticipate the aging process and support individuals who want to live at home by giving them more options and greater control (Hiatt, 1988b).

The design of a house can contribute to the independence and self-care of an elderly person. The builder should anticipate potential frailty of the client and incorporate features that will support future needs. Hiatt (1984) states that "functional design" should be the goal for housing designed for the older person. Functionally designed environments should look conventional but be subtly tailored to support the individual's needs.

Functional, universally designed home environments that enhance independence will also be helpful to people who care for aging relatives (HIG, 1990). Gerontological studies have documented generational interdependence and the reciprocity of giving and receiving help throughout life (Gunn, 1988). Since this relationship suggests frequent visiting back and forth, homes for both age groups need to be convenient and safe.

By emphasizing and improving the impairments of the environment rather than those of the person, a designer helps older adults to more fully participate in their neighborhoods and communities and increases their quality of life (Redfoot & Gaberlavage, 1991). The residential environment encompasses many human made, social, and natural features to make the adaptation to old age either easier or more difficult (Golant, 1985).

In Sweden, it is now public policy to build new homes or adapt old ones to meet the needs of the elderly. The aim in instituting this policy is to enable people to continue to live where they have been living (Gunn, 1988). It is doubtful that the United States will adopt such a progressive program in the near future. Instead,

the solutions to the problems of aging in place will be the result of informed decisions made by the private sector (Callahan, 1992).

### The Consumer

Over half (53%) of older Americans have done little or no planning for their housing needs in later years (AARP, 1990b). There is a reluctance on the part of consumers to admit to the possibility of their needs changing as they age. To make an informed decision about future housing, an individual needs an understanding of the physical and emotional changes that occur with aging. Consumers need to be aware of how the environment interacts with their needs and should learn to evaluate a design in terms of its effect on their needs as they grow older (Gabb et al, 1991). If the consumers could communicate their preferences more effectively, home builders might find it more profitable to accommodate them (Gunn, 1988). There will continue to be no incentive for home builders to make changes in design unless the consumers demand housing that is more responsive to their needs. Quite often consumers must select from what is available and may not find an environment that will meet their changing needs. Consumers have limited input into housing design through the market, what they do have tends to be reactive instead of proactive (Gabb et al, 1991; Hiatt, 1988). To build new housing without seizing the opportunity to create a more supportive environment for the changing needs across the life span is to spend money on a short-sighted and short-term solution for housing (Hiatt, 1984). In the future, there should be some form of design

regulations imposed on the building of single-family residences, just as there is for public buildings.

### The Market

Until recently there has not been a large number of elderly-specific or universal design products available. However, recent data from census reports, indicating the increasing population size and purchasing power of the elderly, have stimulated new interest in investments related to older people (Hiatt, 1988a). Today there are a wide variety of products on the market that assist in independent living but few are used in actual construction.

Builders' own fears and stereotypes about older people might be a contributing factor in the reluctance to specify these features. Products that aid elderly people are often thought to be clumsy and sterile and are often associated with the "nursing home look". There are examples on the market that are well designed and do not evoke this association (National Association of Home Builders, [NAHB], 1991). Many persons above the age of 60 do not consider themselves old and prefer products and settings that are normal (Blank, 1988). The key to marketing new innovations and housing adaption so that consumers will accept them is to present them in such a way that no one notices anything special. The new features would be seen as convenient and standard to a normal dwelling (Gunn, 1988).

The Hartford House is an example of a successful marketing technique. The full scale transportable model home incorporates

many home modifications that can help compensate for age related changes and disabilities. The purpose of the house is to demonstrate new design concepts, helpful products, and technology that can help individuals live in their homes longer with safety, security, comfort and convenience (HIG, 1990). The house has been seen by thousands (consumers and builders) during exhibits throughout the country.

There are many guidelines and other sources of information available to building providers and their clients. The NAHB Research Center is a non-profit contract research firm that serves as the research arm of the home building industry. In addition to printed materials, the Center offers speakers on a variety of topics, visual presentations, and seminars on accessibility and special needs housing. The NAHB, under a grant from the U.S. Department of Health and Human Services' (HHS) Administration on Aging, developed a method for allowing elderly persons to age in place by training building professionals on available state-of-the-art building products and design solutions for retrofitting homes (NAHB, 1991). This demonstrates an approach to facilitating extended independent living of elderly through the appropriate modification of their environment.

Another effective and useful marketing tool was developed by the U. S. Architectural and Transportation Barriers Compliance Board. They designed a software and hard-copy database information system (HAIS), on dwelling design and modification, to facilitate the production of accessible housing (NAHB, 1991).



Cost

The ability to remain at home depends, to a considerable degree, on the adaptability of the home environment to an individual's physical limitations that result from age. Increasing costs of institutional care should be an incentive for designing houses that will allow people to remain at home as long as possible. The average national cost of nursing home care is approximately \$2000 per month (NCHS, 1991). This is considerably higher than the cost of staying in and maintaining an individual home. During the 1990's nursing home costs are projected to be roughly 75 billion dollars (Jacobs & Abbott, 1983). A large portion of institutional care is borne by federal, state and local governments, primarily through Medicare and Medicaid. In 1990, Medicaid financed 45% of nursing home costs (NCHS, 1991).

With the exception of stair lifts and elevators, modifying an existing home for an elderly person with accessible features such as ramps, handrails, pushbars on doors, widened doorways and hallways, and raised toilet seats should cost less than \$1000 per feature (Schreter, 1991). New construction of universally designed and adaptable homes generally costs less than home modification and will only add about five percent to the initial selling price of new construction. Very basic adaptable design features such as wider doorways, adjustable kitchen counters, and walls with supports for grab bars, will be economically feasible over time. These homes will be more functional, encourage independent living and defer institutionalization at a projected savings of billions of dollars

per year to tax payers. In the future, universally designed homes may add to the saleability and resale value of a home (Behar, 1991).

#### Summary

The ability of the aged to experience a satisfying and fulfilling lifestyle depends, in large part, on whether their needs are congruent with what their surrounding environment can offer (Williams, 1991). It is important that the older population be allowed to continue to live with a sense of personal responsibility and control over their own lives in order to maintain their sense of dignity and self respect (AARP, 1990). Since home-ownership among the elderly is expected to increase (Newman, 1986), the design community should be educated about structural interventions that can be included in the environment. The home building industry needs more knowledge of housing-related needs, and the information that they do have should be fully understood and used. Builders need to be able to expand beyond their own frame of reference and incorporate consumer needs in their designs (Gabb et al, 1991). Designing housing that will adapt to the individual rather than require the person to adapt to the house is a realistic goal for the home of the older person (Christenson, 1990).

## CHAPTER III

### METHODOLOGY

This study was designed to determine the knowledge and attitudes of aging, and awareness of products and features that affect the design of single family homes. It is thought that the findings of this study will give a better understanding of the reasons why accessibility in private residences is not a standard practice in the building industry. Although the problem of providing housing that promotes independence for aging adults as well as for the disabled and young children is not new, little is known about why standard housing has not changed to accommodate their needs.

Two models were developed from the research objectives by the researcher to illustrate the hypothesized relationship between knowledge and attitude of aging, the awareness of accessible design features and the actual use of these features in the design of single family residences. The models are illustrated in Figures 1 and 2.

In this study, the home builders knowledge, and attitudes of aging and awareness of accessible design features were looked at in relation to the houses they design and build. The knowledge of facts about aging, the attitudes about aging and the awareness of accessible products and features can be viewed as the independent variables in the first model (Figure 1). An assumption was made that knowledge and attitude would influence the degree of use of

accessible products and features in the construction of a house. Sociodemographic variables such as education, gender, age, occupation and length of practice were used as independent variables. It was also assumed that these variables would also predict the use of accessible products and features in residential design. For the purpose of this model, the use of accessible features and products in the design of the house was the dependent variable.

The second model (Figure 2) is similar to the first except that it used design awareness as the dependent variable.

#### Type of Research

This study was based on descriptive research using a survey research design. Descriptive research encompasses a broad range of research types with the exception of historical and experimental (Issac & Michael, 1981). According to Best and Kahn (1986) the purpose of descriptive research is to:

1. use inductive-deductive reasoning to make generalizations,
2. employ randomization in sample selection so that error may be estimated,
3. describe the procedures accurately and completely in order to replicate the study and,
4. use variables that already exist and are not manipulated by experimental procedures.

This study may also be defined as a survey study because of the method of data collection used. The purpose of survey was to

determine the incidence and distribution of the variables under study and to identify associations among variables (McAuley, 1987).

#### Sample Selection

The sample for this survey was obtained from the membership list of the Oklahoma Home Builders Association (OHBA). The member list was acquired through the office of the OHBA's Executive Director, located in Oklahoma City, Oklahoma. The total membership list of 2000 included individuals who were associated with the building industry in some capacity.

The members included realtors and commercial builders as well as contractors, and architects. For the purpose of this study a 700 member sub-list was drawn from the total membership list. This sub-list included only those members who were directly involved with the actual design or building of single family residences. The computer program SAS was used to generate 200 random numbers from the sub-list. The decision to obtain the random sample of 200 from the sub-list was made in order to increase the validity of the study by eliminating the chances of surveying a member who was not involved in home building.

One hundred surveys (50% of the target response) were returned to the researcher. Eleven of the surveys were not used because they were incomplete. Eighty-nine surveys were used in the analysis for the thesis. The demographic characteristics of the home builders can be found in Table 1. The majority of the sample were males (92%) ranging in age from thirty to over fifty years. Most were

college graduates, and reported their professional title as general contractors who had been in practice from eleven to twenty years. A majority of their work was residential and they built mainly custom homes ranging in size from 1000 s.f to over 3000 s.f.

#### Instrumentation

In the effort to assess the attitude and knowledge of the group concerning the aging process and the products and features for independent living, a self-administered survey was used. The survey was pilot tested by administering it to several home builders in the Stillwater area. Following the pilot study the instrument was revised for clarity and format.

The survey (Appendix A) was divided into three sections; Background Information (demographics), Palmore's Facts on Aging Quiz II, and Design Awareness and Use. The entire survey took approximately fifteen minutes to complete.

#### Background Information (Demographic) (BI)

The first section of the survey (Appendix A) included 12 demographic questions. The respondents were asked their age, gender, education, occupational title (architect, contractor or other) and length of time in practice. Other questions such as what percentage of their work was residential and the average cost of the houses they build was also asked.

### Palmore's Facts On Aging Quiz II

The second section of the survey (Appendix A) was the Facts on Aging Quiz II. Palmore developed the first Facts on Aging Quiz (FAQ) in order to help demonstrate a widespread ignorance about aging and to increase professional understanding of the aging process (Palmore, 1977). The instrument was tested and found to be reliable by Holtzman and Beck (1979). On the other hand, Klemmack (1978) suggested that the original FAQ measured stereotypes and did not measure knowledge of aging. Several criticisms, including ambiguous terminology, "double-barreled" statements and objective and subjective facts, were made about the original FAQ scale by Miller & Dodder (1980).

In attempt to compensate for the weaknesses found in the original FAQ, and take into account suggestions researchers had, several items were revised by Palmore (1988). The revisions included the addition of a "don't know" response so as not to force a response when the respondent did not know. The FAQ II scales were made up of factual statements that can be documented by empirical research. The scales were designed to cover basic physical, mental, and social facts in addition to common misconceptions about aging. The FAQ II was composed of 25 fixed choice questions, which have true/false, and don't know responses.

The validity and reliability of the FAQ II was high. The documentation of the questions, through statistics and studies demonstrating the facts, is the primary evidence for the validity of the quiz. All of the items have a high degree of "face validity"

because the findings come from national studies, local studies and agreement of experts in the area of Gerontology. More support for validity comes from the fact that individuals who have been trained in Gerontology tend to score higher on the quiz. Rank ordering the questions in terms of percentage wrong also increases the quiz's validity. This is shown by the fact that the most frequent misconceptions are consistently chosen in most of the studies. The "don't know" response reduces guessing which improves the reliability of the quiz.

The following questions are representative of those that were used on the survey: (1) At least one-tenth of the aged are living in long stay institutions, (such as nursing homes, mental hospitals, or homes for the aged), (2) Physical strength tends to decline with age, (3) The majority of old people live alone.

The survey was used to measure and compare levels of knowledge and misconceptions about aging. The percentage correct measures the overall amount of knowledge; the percentage wrong measures the amount of misconception that needs to be corrected; and the percentage of "don't know" responses measures the amount of ignorance that needs information.

The FAQ II also served as an indirect measure of attitude towards the aged. The percentage-wrong measure was the basis for measuring attitudes. The bias scores were based on the assumption that certain misconceptions about the aged indicate positive or negative bias. Sixteen questions were classified to indicate a negative bias if marked incorrectly and five items were classified



as indicating a positive bias if they were marked incorrectly. Three measures of bias were computed: an anti-aged bias score (percentage of negative bias items marked wrong), a pro-age bias score (percentage of positive items marked wrong), and a net bias score (pro-age score minus the anti-aged score). A negative score was indicative of a anti-age bias; a positive score showed a pro-age bias.

#### Design Awareness and Use (DAU)

The third section of the instrument (Appendix A), developed by the researcher, consisted of a total of 36 questions pertaining to the awareness and use of universal design-based products and design features that enhance independent living. Twenty-seven of the questions were in an ordered response choice table format. The nine additional questions consisted of close-ended questions and open ended questions. The close-ended questions included a combination of; fixed, ordered response choices, fixed unordered response choices, and fixed partially close-ended choices. One yes/no question was also included in the instrument.

The validity and reliability of this measurement tool was improved by administering a pilot test to home builders in the Stillwater area. The list of accessible features and products was compiled from experts in the field of accessible design (Center for Accessible Housing, 1993; Mace, Hardie, & Place, 1990).

Examples of these questions include:

1. In general to what extent do you agree that the current American Disabilities Act (ADA) should be applied to residential design? (Please check one).

strongly agree  agree

disagree  strongly disagree

2. To what extent do you consider accessible features and products clinical in appearance?

great deal  some  not at all

3. Are you familiar with the term Universal Design?

yes  no

#### Data Collection

Babbie's (1983) Survey Research chapter was followed as guide for the data collection. The procedure involved sending a cover letter along with the survey (Appendix A). The cover letter informed the respondents that approval and endorsement of the study was given by OHBA's Executive Director and requested participation in the study on a voluntary basis. The survey and letter was sent to 200 potential respondents by first class mail. A self addressed, stamped, business reply envelope was included to return the completed questionnaire. A follow up letter and survey (Appendix A) was sent to those who had not responded four weeks after the initial survey mailing.

### Data Analysis

Statistical procedures for this research included Pearson Correlation coefficients and multiple regression analysis. Pearson correlation coefficients were examined to identify significant relationships between each variable and use and awareness of accessible features and products. Multiple regression analysis was used to examine the research models. The primary predictor variables (i.e., knowledge, attitude and awareness) and sociodemographic variables (i.e., gender, age, years in practice, education, and occupation) were used in a regression equation using use and awareness of accessible features and products as the dependent variables. Prior to data analysis, dummy variables were developed for the gender of the builders and the occupational title of the builders. Male respondents were coded 0, female coded 1; and the title of contractor was coded 0; other coded 1.

CHAPTER IV

HOME BUILDERS' ATTITUDES AND KNOWLEDGE  
OF AGING: THE RELATIONSHIP TO DESIGN  
FOR INDEPENDENT LIVING.

MANUSCRIPT FOR PUBLICATION

Journal Title: Journal of Housing for the Elderly

## Abstract

This study examined the relationship between home builders' attitudes/knowledge of aging and their awareness/use of accessible products and features in residential design. Eighty-nine Oklahoma home builders completed a comprehensive survey that included demographics, building practices, and Palmore's FAQII. The mean score for knowledge of aging was 12.5 out of 25. The net-bias mean score for attitude was -24.97 indicating a tendency for the sample to think negatively about the elderly. A conceptual model to predict use and knowledge was developed and tested using multiple regression analysis. No significant relationships were found between the predictor variables (i.e., sociodemographic factors, knowledge and attitude) of aging and the criterion variables (i.e., use and awareness of design factors). Pearson's correlation coefficient indicated that the correlation between awareness and use was significant at the .05 level. Results indicated that home builders were aware of a higher percentage of accessible features than they actually used. The majority of builders indicated that accessible features in a residence was a viable idea but their use depended on client awareness and request.

## Introduction

Today, one out of every ten Americans is over 65 years of age, with the fastest growing portion of this group being age 85 years and older. Life expectancy has dramatically increased over the last several decades and now is reported as 73 years for males and 79.6 years for females. With advancements in technology and medicine this trend is expected to continue. (American Association of Retired Persons [AARP], 1990b, 1992; Barrow, 1992).

The increase in the proportion of older people in the population has generated concern about their ability to function and live independently. The sheer numbers of the elderly will make traditional forms of institutional care, such as nursing homes, boarding homes and psychiatric hospitals less viable solutions (Null, 1989).

Developmental and physiological changes that occur with age have an impact on the ability of older people to function in the community and carry out activities of daily living (Czaja, 1988). The environment in which one lives can aid or hinder these basic tasks such as dressing, bathing and eating. Researchers have recognized that design of the physical environment plays a major role in the ability of an elderly person to continue to perform daily tasks and thereby to continue to live independently. The ability to carry out daily activities such as meal preparation, bathing and cleaning is a major factor in the families or health professionals assessment of an older person's ability to function independently. Results from such assessments play a role in

recommending continued independence versus institutionalization (Altman, Lawton & Wohlwill, 1984).

Institutionalization is costly in human and economic terms. In human terms, the majority of elderly people value their independence and prefer to age in their own homes (Shapiro & Tate, 1988). "Aging in place" allows people to continue to enjoy privacy, independence and be in control of their lives and maintain the comfort and familiarity of the home and neighborhood in which they live. It has been documented that the environment in which people live can contribute to their emotional health and well being (Andreasen, 1985; Lawton, 1989). This is especially true for home environments of the elderly because the amount of discretionary time spent inside the home increases with age; up to 80-90% of their time each day is spent in their homes (AARP, 1990b, 1992; Czaja, 1988).

In terms of economics, as the proportion of the elderly population increases, the problem of institutionalization and its cost may assume even greater importance (Kahana, 1974). The national average for skilled and intermediate nursing home care ranges from \$1,400 to \$2,000 per month (National Center for Health Statistics, [NCHS], 1991). Therefore, aging at home will become an increasingly viable solution. Families, as well as, builders and other housing professionals would benefit from understanding the advantages of home designs that allow individuals to remain living independently for the maximum period of time. Residential environments that are accessible and functional for all people without regard to age, ability or physical limitations can aid in

life-long tenancy. By routinely incorporating universal design features which offer support, are adaptable, accessible, and provide for life safety, a total life-span environment can be economically achieved (Beitz, Kirby, & Brewer, 1992)

### Housing and Independence

This study used the person-environment transaction theory or the competence model proposed by Lawton and Nahemow (1973). The basic premise of the model is that behavior and satisfaction are contingent upon the dynamic balance between demand of the environment, (press), and the individuals abilities to deal with that environmental demand (competence). As an individual ages, age associated changes contribute to a lower level of competence which makes them more susceptible to changes in environmental press. This theory supports the emphasis of this study; enabling people to remain at home longer with the aid of appropriately designed environments.

Planned housing and institutions constitute only a small portion of where older people live. Today the proportion of elderly people living in institutions is around five percent. Remaining in place is by far the most frequent decision made by older people when making decisions about where to live when they get older. However, past and current building practices do not promote the concept of "aging in place". There is a growing concern of how older people will deal with their existing housing in ordinary neighborhoods (Lawton & Hoover, 1981; Struyk, 1977). The development of a new



approach to housing must begin with an understanding of what it means to grow old in our society.

### Health and Independent Living

The life cycle is a process of biological, psychological and social change which requires constant adaptation by individuals and the environments in which they live (Hoglund, 1983; Lawton, 1989). The change occurs at different rates for different people, which makes chronological age a poor indicator of physical age and change (Salmon, 1963; Gunn, 1988; Ferrini & Ferrini, 1989). There are individuals in all age groups who experience some disability or impairment. For most of the population, the aging process does lead to a gradual decline in functioning and an increase in dependence, due to changes in vision, hearing, mobility, agility, strength, endurance and dexterity. However, increased dependence does not necessarily mean a loss of independence (Hoglund, 1983). Physical environments can be designed or modified to accommodate these changes (Hartford Insurance Group, [HIG], 1990). The built environment can help maximize the control older people have over their surroundings and reduce their sense of helplessness (Christenson, 1990).

Losing their independence due to health reasons is a fear that many older adults have. Independence and the ability to control one's environment have been found to be powerful variables in human behavior. Enhanced control has been related to enhanced self-

esteem. Identifying ways to maintain control is essential to the well being of the elderly (Barques, Waxman, & Yaffe, 1988).

#### The Meaning of Home

The home has special significance for older persons; it is a meaningful expression of their personal and social self and holds much emotional significance (Michelson, 1977; Cooper-Marcus, 1974; Dangelis & Fengler, 1990). Researchers have observed that an older person's home represents a reservoir of family history and memorabilia (Csikszentmihalyi & Rochberg-Halton, 1981). Remaining in the family home perpetuates a sense of tradition and preserves self-esteem (O'Bryant, 1983). To be forced to leave this familiar and secure environment means losing memories, independence and control.

Secure environments may be tied to economic issues. Of the ninety-five percent of American elders who live in non-institutional settings, seventy-five percent own the dwelling in which they live (AARP, 1990b; Callahan, 1992). Since most elderly home owners have paid off their mortgage, the home is also a great economic asset (Danigelis & Fengler, 1990). In a recent AARP survey of consumer preferences, concerns and needs, a significant finding was that the preference for aging-in-place is prevalent among older people. Eighty-six percent said they wanted to stay in their present home and never move (AARP, 1990b).

Gerontologists have shown particular interest in how much the elderly's morale or life satisfaction is influenced by their

residential environment. Residential well being is closely related to psychological well being (Lawton, 1989). Research has shown that the elderly spend eighty to ninety percent of their day at home (AARP, 1990b; Gabb, Lodel, & Combs, 1991). The home environment is a physical setting for life's events, and plays a major part in an individual's hopes and dreams (Hoglund, 1983).

### Current Practices

Traditionally, individuals have had to adapt in order to "fit" an environment, instead of adapting the environment to "fit" the individual (Null, 1989; Brent & Brent, 1987). Most older people live in standard, conventionally built, single-family detached dwellings that were built prior to 1950 (AARP, 1990a). The market for these houses is generally targeted at people in the 30-55 year old age range. This housing type has been described as "Peter Pan" housing. The name conveys the concept that the housing was designed for people who will never grow old (Hare, 1992). Living spaces have long been designed for use by one "average" physical type, the young, fit, adult male (Pastalan, 1988). The majority of standards and design practices in use prior to the 1950's have continued into the 1990's and do not respond to the needs and requirements of a large segment of the population. This is true not only for standard "spec" housing but also for custom built homes. Research indicates that the elderly make very few alterations to their living environments, therefore they may live in places not suitable for

their needs (Beitz, Kirby & Brewer, 1992; Brent, Lower-Walker, & Twaddell, 1983).

Historically, home builders have not seen the environment as part of a support system in assessing or responding to an individual's needs, and seldom recommend that changes in standards be made (Hiatt, 1984). Instead, builders focus on the tangible features of a home, such as the structure and the visual aesthetics. They have very little concern the about interaction between the environment and the person (Hoglund, 1983).

Although most home builders seem to understand that the environment has an effect on the user, few give this much consideration when designing (Gabb et al., 1991). In a study by Reizenstein (1975), most of the designers surveyed were aware of environment and behavior research and believed that the environment influences behavior. However, few of the designers had ever used the research findings in their work. They did not incorporate the findings because the findings were not readily available or were written in "jargon-like" language, and the implications for design were not immediately obvious.

Sommer (1974) identifies several explanations for the reluctance of professionals to pay attention to the values and needs of the occupants. He suggests that rather than trying to accommodate the varied needs of different types of users, it is easier for builders to assume that everyone has similar needs and tastes. Home builders are often supplier oriented and are most

interested in persuading users to accept the designs they want to supply (Gabb et al., 1991).

Historically, society has underestimated the need for housing that encourages independent living. Society has been too protective and has promoted helplessness rather than independence (Gunn, 1988). This phenomenon can be seen in the reluctance of the building industry to design houses that promote independence and may defer institutionalization. For all individuals, habits and values are slow to change; there is no exception concerning the use of conventional building practices. Many home builders build according to building paradigms that are based on tradition. Builders are often unwilling to part from tradition long enough to see another way of doing things. In order to change the current industry standards, home builders need to understand their present building paradigms and move on to new ones based on real needs rather than tradition.

#### Alternative Practice

The concept of universal design is based on the idea that design can meet the needs of all people, without regard to age, allowing them to achieve some balance of dependence and independence despite permanent or temporary disabilities (Null, 1989; McLeister, 1989; Hogle, 1983; Mace, Hardie, & Place, 1990). During the course of their lives most people will need, at least temporarily, a supportive environment similar to that needed by the elderly (Gunn, 1988). Universal design features fit these needs since they offer

support, they are adaptable, accessible and they provide life safety (Raschko, 1987). Examples of universal design features include, but are not limited to, the following: package shelves at entries, level thresholds, wide door openings, wide hallways, lever handled faucets and door hardware, ground level entry, low pile carpet, non-skid floors, adjustable counter heights, anti-scald devices, reinforced walls for grab bars, shower or tub with built in seating. Universal design has received support and its use in construction promoted and encouraged by the United States Department of Housing and Urban Development (HUD) and The American Society of Interior Designers (ASID) (HUD, 1988).

The Fair Housing Act of 1988 incorporates the principles of universal design. However, the law only applies to residential buildings containing over four units. Smaller buildings and single family homes are exempt from the law (Pynoos, 1992). Demographic trends in the United States today will increase the need for single family housing that will meet the needs of people of all ages and various disabilities (Gunn, 1988; Lueck, 1987). Expanding the Fair Housing Act to cover single family homes would be a positive step toward a nation wide movement to promote universally designed housing. Many problems that existing homes present for "aging in place" would be eliminated if supportive, adaptable and accessible housing were built to begin with.

The design of a house can contribute to the independence and self-care of an elderly person. The builder should anticipate potential frailty of the client and incorporate features that will

support future needs. Hiatt (1984) states that "functional design" should be the goal for housing designed for the older person. Functionally designed environments should look conventional but be subtly tailored to support the individual's needs.

Functional, universally designed home environments that enhance independence will also be helpful to people who care for aging relatives (HIG, 1990). Gerontological studies have documented generational interdependence and the reciprocity of giving and receiving help throughout life (Gunn, 1988). Since this relationship suggests frequent visiting back and forth, homes for both age groups need to be convenient and safe.

In Sweden, it is now public policy to build new homes or adapt old ones to meet the needs of the elderly. The aim in instituting this policy is to enable people to continue to live where they have been living (Gunn, 1988). It is doubtful that the United States will adopt such a progressive program in the near future. Instead, the solutions to the problems of aging in place will be the result of informed decisions made by the private sector (Callahan, 1992).

#### The Consumer

Over half (53%) of older Americans have done little or no planning for their housing needs in later years (AARP, 1990b). There is a reluctance on the part of consumers to admit to the possibility of their needs changing as they age. To make an informed decision about future housing, an individual needs an understanding of the physical and emotional changes that occur with aging.

Consumers need to be aware of how the environment interacts with their needs and should learn to evaluate a design in terms of its effect on their needs as they grow older (Gabb et al, 1991). If the consumers could communicate their preferences more effectively, home builders might find it more profitable to accommodate them (Gunn, 1988).

There will continue to be no incentive for home builders to make changes in design unless the consumers demand housing that is more responsive to their needs. Quite often consumers must select from what is available and may not find an environment that will meet their changing needs. Consumers have limited input into housing design through the market, what they do have tends to be reactive instead of proactive (Gabb et al., 1991; Hiatt, 1988a). To build new housing without taking the opportunity to create a more supportive environment for the changing needs across the life span is to spend money on a short-sighted and short-term solution for housing (Hiatt, 1984).

#### The Market

Until recently there has not been a large number of elderly-specific or universal design products available. However, recent data from census reports, indicating the increasing population size and purchasing power of the elderly, have stimulated new interest in investments related to older people (Hiatt, 1988a). Today there are a wide variety of products on the market that assist in independent living but few are actually used in construction.



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printed materials, the Center offers speakers on a variety of topics, visual presentations, and seminars on accessibility and special needs housing. The NAHB, under a grant from the U.S. Department of Health and Human Services' (HHS) Administration on Aging, developed a method for allowing elderly persons to age in place by training building professionals on available state-of-the-art building products and design solutions for retrofitting homes (NAHB, 1991). This demonstrates an approach to facilitating extended independent living of elderly through the appropriate modification of their environment.

#### Cost

The ability to remain at home depends, to a considerable degree, on the adaptability of the home environment to an individual's physical limitations that result from age. Increasing costs of institutional care should be an incentive for designing houses that will allow people to remain at home as long as possible. The average national cost of nursing home care is approximately \$2000 per month (NCHS, 1991).

This is considerably higher than the cost of staying in and maintaining an individual home. During the 1990's nursing home costs are projected to be roughly 75 billion dollars (Jacobs & Abbott, 1983). A large portion of institutional care is borne by federal, state and local governments, primarily through Medicare and Medicaid. In 1990, Medicaid financed 45% of nursing home costs (NCHS, 1991).

With the exception of stair lifts and elevators, modifying an existing home for an elderly person with accessible features such as ramps, handrails, pushbars on doors, widened doorways and hallways, and raised toilet seats should cost less than \$1000 per feature (Schreter, 1991). New construction of universally designed and adaptable homes generally costs less than home modification and will only add about five percent to the initial selling price of new construction. Very basic adaptable design features such as wider doorways, adjustable kitchen counters, and walls with supports for grab bars, will be economically feasible over time. These homes will be more functional, encourage independent living and defer institutionalization at a projected savings of billions of dollars per year to tax payers. In the future, universally designed homes may add to the salability and resale value of a home (Behar, 1991).

#### Methodology

This study was designed to determine if knowledge and attitudes of aging, and awareness of products and features affect the design of single family homes. The findings of this study give a better understanding of the reasons why accessibility in private residences is not a standard practice in the building industry. Although the problem of providing housing that promotes independence for aging adults, as well as for young children, and the disabled is not new, little is known about why standard housing has not changed to accommodate their needs.

Two models were developed by the researcher to illustrate the hypothesized relationship between knowledge and attitude of aging, the awareness of accessible design features and the actual use of these features in the design of single family residences. The models are illustrated in Figures 1 and 2.

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Insert Figures 1 and 2 about here

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In this study, the home builders knowledge, and attitudes of aging and awareness of accessible design features were looked at in relation to the houses they design and build. The knowledge of facts about aging, the attitudes about aging and the awareness of accessible products and features can be viewed as the independent variables in the first model (see Figure 1).

An assumption was made that knowledge and attitude would influence the degree of use of accessible products and features in the construction of a house. Sociodemographic variables such as education, gender, age, occupation and length of practice were also used as independent variables. It was assumed that these variables would also predict the use of accessible products and features in residential design.

For the purpose of this model, the use of accessible features and products in the design of the house was the dependent variable. The second model (see Figure 2) is similar to the first except that it used awareness of accessible products and features as the dependent variable.

This study was based on descriptive research using a survey research design. The survey was used to determine the incidence and distribution of the variables under study and to identify associations among variables (McAuley, 1987).

#### Sample Selection and Characteristics

The sample for this survey was obtained from the membership list of the Oklahoma Home Builders Association (OHBA). The total membership list of 2000 included individuals who were associated with the building industry in some capacity. The members included realtors and commercial and residential builders as well as contractors, and architects. For the purpose of this study a 700 member sub-list was identified and drawn from the total membership list in order to eliminate the chance of choosing a non-builder. This sub-list included only those members who were directly involved with the actual design or building of single family residences. The computer program SAS was used to generate 200 random numbers from the sub-list. One hundred surveys (50% of the target response) were returned to the researcher. Eighty-nine surveys were used in the analysis.

The majority of the sample were males ranging in age from thirty to over fifty years. Most were college graduates, and reported their professional title as general contractors who had been in practice from eleven to twenty years. A majority of their work was residential and they built mainly custom homes ranging in size from 1000 s.f. to over 3000 s.f.

### Instrumentation

In the effort to assess the attitude and knowledge of the group concerning the aging process and the products and features for independent living, a self-administered survey was used. The survey was divided into three sections; Background Information (demographics), Palmore's Facts on Aging Quiz II, and Design Awareness and Use. The entire survey took approximately fifteen minutes to complete.

The first section of the survey included demographic information. In addition questions such as what percentage of residential construction and cost were looked at.

The second section of the survey used the Palmore Facts on Aging Quiz II. The FAQ II scales were made up of factual statements that can be documented by empirical research. The scales were designed to cover basic physical, mental, and social facts in addition to common misconceptions about aging. The FAQ II is composed of 25 fixed choice questions, which have true/false, and don't know responses. The survey was used to measure and compare levels of knowledge and misconceptions about aging. The FAQ II also served as an indirect measure of attitude towards the aged.

The third section of the instrument, developed by the researcher, consisted of a total of 36 questions pertaining to the awareness and use of universal design-based products and design features that enhance independent living. The validity and reliability of this measurement tool was improved by administering a pilot test to home builders in the Stillwater, Oklahoma area. The

list of accessible features and products was compiled from experts in the field of accessible design (Center for Accessible Housing, 1993; Mace, Hardie, & Place, 1990).

#### Data Collection

This study involved a survey design research procedure which included sending a cover letter along with the questionnaire. The cover letter informed the respondents that approval and endorsement of the study was given by OHBA's Executive Director and requested participation in the study on a voluntary basis. The survey and letter was sent to 200 potential respondents by first class mail. A self addressed, stamped, business reply envelope was included for the return of the completed questionnaire. A follow up letter and survey was sent to those who had not responded four weeks after the survey mailing.

#### Findings

The mean knowledge score (Table 2) on the FAQII was 12.51 (50%) correctly answered out of a possible 25. The scores ranged from a low of 2 to a high of 18.

According to Palmore (1988), the percent correct measures the overall amount of knowledge. The highest mean score that was reported to Palmore for any group was 69%. The mean attitude score (percentage of positive errors minus the percentage of negative errors) was -24.97. This net-bias score indicates that the sample of builders tend to think negatively about the elderly. Out of a

potential high score of 108, the mean score on the awareness section was 61.74 and the mean score for the use section was 74.33.

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Insert Table 2 about here

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Two multiple regression models were used to help explain the variance of the use/awareness scores among the respondents. The first regression analysis involved the criterion variable use and the predictor variables knowledge, attitude, and awareness and the sociodemographic variables; gender, age, years in practice, education, and occupation. Stepwise multiple regression analysis revealed that none of the predictor variables were significant contributors of the use of accessible products.

The second multiple regression analysis involved the criterion variable awareness and the predictor variables knowledge, attitude, and the demographic variables; gender, age, years in practice, education, and occupation. One variable, attitude (net-bias), was found to be approaching significance at the .15 level ( $P = .1239$ ,  $F = 2.42$ ). The model explained 3.5% of the variance, ( $R^2 = .0305$ ). The builders who had a more negative attitude of aging tended to be less aware of accessible products and features.

Pearson's correlation coefficient (Table 3) was used to determine the association between selected variables. Age was found to have significant positive relationships with years in practice ( $p < .01$ ), and attitude ( $p < .01$ ). Those respondents who were older tended to have been in the construction business longer and have a



less positive attitude of aging. Awareness was found to be significantly related to years in practice ( $p < .02$ ), and use ( $p < .01$ ). Those respondents who had worked in the building industry the longest tended to be less aware of products and features. Respondents that reported more awareness correspondingly reported a higher incidence of use of the features and products.

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Insert Table 3 about here

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#### Implications

Although the results did not support the proposed models, other valuable information was gained from the study. The findings supported the idea of the reluctance of builders to break from traditional building values. Those respondents who had worked in the building industry the longest tended to be less aware of products and features. In addition, those respondents who were older tended to have been in the construction business longer and had a less positive attitude of aging.

These findings suggest that the home building industry would benefit in actively pursuing builders for educational programs concerning aging and accessibility. Although information is now available to builders, few seek it. Realistic cost assessments for accessible features should also be outlined for different regions of the country and made available to builders. In order to change the current industry standards, home builders need to understand their

present building paradigms and move on to new ones based on need rather than tradition.

The researcher's attempt to identify the reasons accessible products and features are not used in residential design is hoped to bring attention to the need for change in current building practices. In this study no significant relationship was found with the builders' attitude or knowledge of aging with the awareness/use of accessible features. Although the researcher's hypotheses were not confirmed in the study, other potential variables surfaced that could be looked at in future studies.

Two variables that appear to be highly correlated are cost and consumer demand. Future studies should consider cost and consumer demand to help explain the lack of use of accessible features in residential environments. A survey geared toward consumer awareness is one way that this study could be done.

Educational materials should be made easily available to the consumer when deciding to build a house. The home building industry, specifically home builders such as architects and contractors who deal with and influence clients, should have this material available to give to potential clients. The builder should stress the importance and conveniences of accessible designs and long range plans should be discussed with the client. It is hoped that accessible features will become standard items in residential environments. As these items are used more frequently and appreciated, the cost increase will become less of a deterrent.

The demographic trends of an aging population will increase the need for new long term housing options. Independent living will no doubt be an option that many will choose. The home building industry in the United States must come to recognize and deal with the special needs of the aging population.

With the recent passage of the American Disabilities Act much attention has been given to accessible environments for public spaces. It seems that the timing is right for the home building industry to take this one step further and apply accessible design techniques to the private housing industry. In the future, there should be some form of design regulations imposed on the building of single-family residences, just as there is for public buildings.

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APPENDIXES

APPENDIX A

QUESTIONNAIRE AND CORRESPONDENCE



**AGING AND DESIGN**

**SURVEY**

*Oklahoma State University*

## ] Section I

This section of the survey will ask basic background information about you. (Please check the appropriate box and/or briefly respond to the question asked.) All information given is held confidential. There will be no identifying names or numbers to identify you with your form.

1.  Male             Female
2. Age:  under 30  
 31-40  
 41-50  
 51-60  
 over 60
3. Education:  
 High School graduate  
 Some college  
 College graduate  
 Graduate or professional degree  
 other
4. How long have you been building/designing houses?  
 0-10 years  
 11-20 years  
 21-30 years  
 over 30 years
5. What is your occupational title?  
(Please check one.)  
 general contractor  
 architect  
 sub-contractor  
 other, please specify \_\_\_\_\_
6. What percentage of your work is residential?  
(Please check one.)  
 0-25%             26-50%     51-75%     75-100%
7. On the average, how many houses per year do you design or build in the following square foot ranges? (Please indicate the number of houses in each range.)  
\_\_\_\_ 1000-1500 s.f.  
\_\_\_\_ 1501-2000 s.f.  
\_\_\_\_ 2001-2500 s.f.  
\_\_\_\_ 2501-3000 s.f.  
\_\_\_\_ over 3000 s. f.
8. What is the average cost per square foot of the houses you design/build? (Please check one.)  
 under \$30  
 \$30-35  
 \$36-40  
 \$41-45  
 \$46-50  
 \$51-60  
 over \$60

9. Approximately what percentage of your business is;  
(Please check one for each category).
- a. spec homes  
 0-25%     26-50%     51%-75%     76%-100%
- b. custom homes  
 0-25%     26-50%     51%-75%     76%-100%
- c. other  
 0-25%     26-50%     51%-75%     76%-100%
10. What is the average age range of your clients? (Please check one.)  
 20-30     31-40     41-50     50-60     over 60
11. To what extent do you consider changes in future needs of the buyer or client when designing/building a house? (Please check one.)  
 great deal     some     not at all
12. How often do you discuss accessibility features and products with a client? (Please check one.)  
 very often  
 often  
 seldom  
 very seldom  
 never

.....

Section II

The purpose of this section of the survey is to measure knowledge of aging. Please circle the statements "T" for true, "F" for false, or "?" for don't know.

1. T F ? A person's height tends to decline with age.
2. T F ? More older persons have chronic illnesses that limit their activities than do younger persons.
3. T F ? Older persons have more acute (short-term) illnesses than do younger persons.
4. T F ? Older persons have more injuries in the home than younger persons.
5. T F ? Older workers have more absenteeism than do younger workers.
6. T F ? Black's life expectancy at age 65 is about the same as whites'.
7. T F ? Men's life expectancy at age 65 is about the same as women's.
8. T F ? Medicare pays over half of the medical expenses for the aged.

9. T F ? Social Security benefits automatically increase with inflation.
10. T F ? Supplemental Security Income guarantees a minimum income for the needy aged.
11. T F ? The aged do not get their proportionate share of the nation's income.
12. T F ? The aged have higher rates of criminal victimization than younger persons.
13. T F ? The aged are more fearful of crime than are younger persons.
14. T F ? The aged are the most law abiding of all adult age groups.
15. T F ? There are about equal numbers of widows and widowers among the aged.
16. T F ? More of the aged vote than any other age group.
17. T F ? There are proportionately more older persons in public office than in the total population.
18. T F ? The proportion of blacks among the elderly population is growing.
19. T F ? Participation in voluntary organizations (churches and clubs) tends to decline among the healthy aged.
20. T F ? The majority of older people live alone.
21. T F ? The aged have a lower rate of poverty than the rest of the population.
22. T F ? The poverty rate among aged blacks is about three times as high as among aged whites.
23. T F ? Older persons who reduce their activity tend to be happier than those who do not.
24. T F ? When the last child leaves home, the majority of parents have serious problems adjusting to their "empty nest."
25. T F ? The proportion widowed among the aged is decreasing.



## Section III

## Part A

This section of the survey is intended to measure awareness and use of accessible products, features, and design practices for residential construction. Please circle one response ranging from 1 (very aware) to 4 (unaware) for the "awareness" section. Please circle one response on the scale ranging from 1 (very often) to 4 (never) for the "use" section.

accessible feature/product	awareness aware of importance of feature/product				use how often used			
	very aware		un- aware		very often		never	
package shelf at entries	1	2	3	4	1	2	3	4
level or 1/8" or less thresholds	1	2	3	4	1	2	3	4
36" wide door openings	1	2	3	4	1	2	3	4
42" wide hallways	1	2	3	4	1	2	3	4
doors with off set hinges	1	2	3	4	1	2	3	4
doors with lever handles	1	2	3	4	1	2	3	4
light switches and controls mounted 42" from floor or lower	1	2	3	4	1	2	3	4
electrical outlets and telephone jacks mounted 18" above floor	1	2	3	4	1	2	3	4
single switch to control multiple outlets	1	2	3	4	1	2	3	4
bathroom doors that open outward	1	2	3	4	1	2	3	4
smoke detectors with audible & visual alarm	1	2	3	4	1	2	3	4
no stairs at entry	1	2	3	4	1	2	3	4

	awareness				unaware	use						
	very aware	1	2	3		4	very often	1	2	3	4	never
non-skid floor surfaces	1	2	3	4		1	2	3	4			
low pile carpet	1	2	3	4		1	2	3	4			
hand-held adjustable shower-head	1	2	3	4		1	2	3	4			
seat in shower or tub	1	2	3	4		1	2	3	4			
wide area at rim of bathtub	1	2	3	4		1	2	3	4			
5' X 5' roll in shower	1	2	3	4		1	2	3	4			
lever handles on water faucets	1	2	3	4		1	2	3	4			
anti-scald temperature controls for faucets	1	2	3	4		1	2	3	4			
reinforced walls for grab bars around toilet, tub, shower	1	2	3	4		1	2	3	4			
adjustable counter top heights	1	2	3	4		1	2	3	4			
"D" shaped handles on cabinets	1	2	3	4		1	2	3	4			
knee clearance under some counter space in kitchen	1	2	3	4		1	2	3	4			
pull out counter tops below or next to oven	1	2	3	4		1	2	3	4			
side opening, wall unit oven at seat height	1	2	3	4		1	2	3	4			
adjustable clothes rod	1	2	3	4		1	2	3	4			

## Section III

## Part B

Please complete the following section by briefly responding to the question and/or checking one of the boxes.

1. From the list of accessible products and features above please list 5 design features, that you feel would be most important for an older person to remain independent.
  1. \_\_\_\_\_
  2. \_\_\_\_\_
  3. \_\_\_\_\_
  4. \_\_\_\_\_
  5. \_\_\_\_\_
  
2. Are you aware of or use any other accessible features that are not listed on the accessible feature/product list above? (Please list in the spaces provided here.)
 

\_\_\_\_\_

\_\_\_\_\_
  
3. In general, to what extent do you consider accessible features and products clinical in appearance? (Please check one.)
 

great deal     some     not at all
  
4. In general to what extent do you agree that the current American Disabilities Act (ADA) should be applied to residential design? (Please check one.)
 

strongly agree

agree

disagree

strongly disagree
  
5. In general, to what extent do you consider accessible design in a typical residence a viable idea? (Please check one.)
 

great deal     some     not at all
  
6. In your opinion when is it most cost efficient to design for accessibility? (Please check one.)
 

initial construction

remodel construction

anytime
  
7. In your opinion, how much of an increase is there to the cost of a house if accessible features and products were included initially? (Please check one.)
 

0-5%     6-10%     11-15%     16-20%     over 20%

8. Briefly explain your reasons for not using accessibility products and features. (If you use them, please skip this question.)

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9. Are you familiar with the term Universal Design?  
 yes       no

.....

THIS IS THE END OF THE SURVEY. THANK YOU FOR YOUR HELP !!!

PLEASE RETURN IN THE POSTAGE PAID ENVELOPE PROVIDED.

IF YOU HAVE ANY QUESTIONS PLEASE CALL:

SUZANNE BELSER  
1116 W. HARNED  
STILLWATER, OKLAHOMA 74075  
(405) 377-0811



Oklahoma State University

DEPARTMENT OF FAMILY RELATIONS AND CHILD DEVELOPMENT  
COLLEGE OF HUMAN ENVIRONMENTAL SCIENCES

STILLWATER, OKLAHOMA 74078-0337  
242 HUMAN ENVIRONMENTAL SCIENCES  
(405) 744-5057 FAX (405) 744-7113

June 18, 1993

Dear OHBA Member,

I am a graduate student at Oklahoma State University and am doing a survey of individuals connected with the home building industry. Your name was selected from the Oklahoma Home Builders Association membership list which was provided by the executive director of the OHBA. The OHBA has reviewed my proposal and has given me permission to contact you for participation in this project.

The research I am doing is concerned with the building industries' knowledge of aging and how this knowledge relates to the use of accessible design practices in residential construction. The attached survey should take you approximately 15 minutes to complete. All of the information you provide in this survey will be confidential and will not be used for any purposes other than this study. A self-addressed, stamped return envelope is provided for your convenience.

If you have any questions about this study please contact me, (405) 377-0811, or my faculty advisor Dr. Joseph Weber, (405) 744-5053. If you would like a copy of the results of this study please fill out and return the enclosed address card along with your survey.

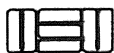
I thank you for your time and cooperation in agreeing to help me complete this research project. I look forward to receiving your survey soon. Thank you again.

Sincerely,

Suzanne Belser  
Graduate Student

1116 W. Harned  
Stillwater, Ok. 74074

Dr. Joseph Weber  
Associate professor



*Oklahoma State University*

DEPARTMENT OF FAMILY RELATIONS AND CHILD DEVELOPMENT  
COLLEGE OF HUMAN ENVIRONMENTAL SCIENCES

STILLWATER, OKLAHOMA 74078-0337  
242 HUMAN ENVIRONMENTAL SCIENCES  
(405)-744-5057 FAX (405) 744-7113

August 10, 1993

Dear OHBA Member,

PLEASE HELP!

I recently sent you a survey on Aging and Design but I have not received your completed survey. I need a minimum number of surveys returned in order to complete the research, so I am asking for your help again. The survey will not take long to complete, and the information it provides may prove to be beneficial to the home building industry.

Please take a few minutes to help me complete this part of my research. Thank you.

Sincerely,

Suzanne Belser  
Graduate Student

APPENDIX B

RESEARCH OBJECTIVES AND ANALYSIS

### Objective One

To determine the builders' level of knowledge of aging and to determine the builder's attitude toward aging.

Builders were administered the FAQII to test their level of knowledge/attitude of aging. Mean score (Table 2) for knowledge on the FAQII was 12.516 (50%), correctly answered out of a possible 25. The lowest score earned was 2, the highest was 18. According to Palmore (1988), the percent correct measures the overall amount of knowledge. The highest mean score that was reported to Palmore for any group was 69%. The highest scores reported in any field of study have been among gerontology students and faculty, the highest being 94% correct. Question numbers 1 (height), 2 (chronic illness), 7 (men's life expectancy), and 23 (activity) were marked correctly over 90% of the time. Question numbers 4 (injuries), 5 (absenteeism), 6 (blacks' life expectancy), 12 (victimization), 16 (vote), and 21 (poverty) were marked incorrectly over 60% of the time. The questions that were most often, (over 20%), marked with the don't know responses were 8 (Medicare), 10 (SSI), 17 (public office), 18 (proportion blacks), 22 (poverty rate), and 25 (widowed).

Builders were administered the FAQII to determine their attitudes toward aging (Table 2). Three measures of bias were computed from the test scores. The mean pro-age bias score (percent



of positive bias items answered incorrectly) was 21.57. The mean anti-age bias score (percent of negative bias items answered incorrectly) was 46.54. The mean net-bias score (percent of positive errors minus the % of negative errors) was -24.97.

### Objective Two.

To determine the builders' awareness level and use of accessible products and features.

Section III, part A was used to measure the awareness and use of accessible products and features. The mean score for the awareness section was 61.74; the mean for the use section was 74.33. Out of a potential score of 108, the lowest score reported for the awareness section was 29; the low score for the use section was 43. The highest score reported for both was 108.

### Objective Three

To determine whether the builders' awareness of accessible features results in their use in residential design.

Pearson's correlation coefficient (Table 3) was used to determine the association between awareness and use of accessible products and features. This indicated a significant positive relationship existed, at the .05 level, between awareness of accessible features and their use.

#### Objective Four

To determine if knowledge of aging and attitude toward aging have an affect on the awareness and/or use of accessible products and features in residential design.

Scores from The FAQII and scores from the awareness and use section of the survey were used for a correlation. Pearson's correlation coefficient (Table 3) was used to determine the association between knowledge and attitude of aging (FAQII) and the awareness and use of accessible features. This indicated that there was no significant relationship between knowledge of aging and awareness or use. It was also found that no significant relationship exists between attitude of aging and awareness or use of accessible features.

## Research Questions

### Research Question Number One

Do home builders have knowledge of facts on aging ?

Home builders in this sample were administered the FAQII to determine their level of knowledge of aging.

Mean score (Table 2) on the FAQII was 12.516, (50%), correctly answered out of a possible 25. The lowest score earned was 2, the highest was 18. Question numbers 1 (height), 2 (chronic illness), 7 (men's life expectancy), and 23 (activity) were marked correctly over 90% of the time. Question numbers 4 (injuries), 5 (absenteeism), 6 (blacks' life expectancy), 12 (victimization), 16 (vote), and 21 (poverty) were marked incorrectly over 60% of the time. The questions that were most often, (over 20%), marked with the don't know responses were 8 (Medicare), 10 (SSI), 17 (public office), 18 (proportion blacks), 22 (poverty rate), and 25 (widowed).

## Research Question Number Two

Do home builders have a negative or positive attitude toward aging?

Builders were administered the FAQII to determine their attitudes toward aging (Table 2). Three measures of bias were computed from the test scores. The mean pro-age bias score (percentage of positive bias items answered incorrectly) was 21.57. The mean anti-age bias score (percentage of negative bias items answered incorrectly) was 46.54. The mean net-bias score (percentage of positive errors minus the percentage of negative errors) was -24.97. This net-bias score indicates that the sample of builders, as a whole, think negatively about the elderly.

### Research Question Number Three

Does a home builders knowledge of facts on aging, and attitude of aging relate to the awareness and use of accessible products and features for residential design?

Scores from the FAQII and from Section III, part A were used for the statistical procedures. Pearson's correlation coefficient (Table 3) was used to determine the association between knowledge of aging and the awareness and use of accessible features. This indicated that there was no significant relationship between knowledge and awareness or use.

Pearson's correlation coefficient (Table 3) was used to determine the association between attitudes of aging and the awareness and use of accessible features. The correlation indicated that there was no significant relationship between attitude of aging and awareness or use of accessible features.

#### Research Question Number Four

Are home builders aware of accessible products and related features and do they use them in residential construction?

Section III, Part A was administered to determine the level of awareness and how often they use accessible products and features. The mean score for all the builders was 61.74, for the awareness section. For the use section the mean score was 74.33. The lowest score reported for this section was 43 and the highest was 108. 108 was the highest point value obtainable and 27 was the lowest that could be obtained.

Pearson correlation coefficients (Table 3) were used to identify significant relationships between other variables and awareness and use of accessible features and products. Correlations were run with the variables age, education, tenure (years in practice), FAQII score, netbias and awareness scores. Awareness, was found to explain almost five percent of the variance in the Use scores. None of the demographic variables, the FAQII scores or the netbias scores were significant in contributing to the awareness or use of accessible products and features.

Further findings in the study showed that wide door openings, doors with lever handles, non-skid floor surfaces, seat in shower or tub, 5' X 5' roll in shower, and reinforced wall for grab bars were the features builders listed as being most important for an older person to remain independent. Of the features the builders listed as being important, over half of the respondents reported



actually using wide doors, non-skid floors, and seats in tub/shower often to very often. Less than half reported actually using lever handled hardware or reinforced walls often or very often.

A majority of the respondents were not familiar with the term universal design. Respondents confirmed that accessible design for residential environments was a viable idea, they cited cost and consumer demand to be a major deterrent. A majority of the respondents reported that initial construction was the most cost efficient time to design for accessibility and that the cost increase would be around 6-10%.

## Research Question Number Five

How do knowledge, attitude, gender, age, years in practice, education and occupation affect use and awareness of accessible features in residential construction?

Two multiple regression models were used to help explain the variance of the use/awareness scores among the respondents. The first regression analysis involved the criterion variable use and the predictor variables knowledge, attitude, and awareness and the sociodemographic variables; gender, age, years in practice, education, and occupation. Stepwise multiple regression analysis revealed that none of the predictor variables were significant contributors of the use of accessible products.

The second multiple regression analysis involved the criterion variable awareness and the predictor variables knowledge, attitude, and the demographic variables; gender, age, years in practice, education, and occupation. One variable, attitude (net-bias), was found to be approaching significance at the .15 level ( $P = .1239$ ,  $F = 2.42$ ). The model explained 3.5% of the variance, ( $R^2 = .0305$ ). The builders who had a more negative attitude of aging tended to be less aware of accessible products and features.

APPENDIX C

TABLES AND FIGURES

Table 1

Demographic Characteristics of Home Builders

<u>Characteristics</u>	<u>Number</u>	<u>Percentages</u>
<b>Gender</b>		
female	7	8.1
male	79	91.9
<b>Age</b>		
under 30	3	3.4
31-40	29	33.0
41-50	28	31.8
51-60	19	21.6
over 60	9	10.2
<b>Education</b>		
High school graduate	10	11.2
Some college	25	28.1
College graduate	41	31.8
Graduate or professional degree	12	21.6
Other	1	10.2
<b>Tenure (years in practice)</b>		
0-10	19	21.3
11-20	44	49.4
21-30	19	21.3
over 30	7	7.9
<b>Title</b>		
General contractor	76	85.4
Other (architect, sub-contractor)	13	14.6
<b>Percentage of Residential Work</b>		
0-25%	4	4.5
26-50%	6	6.8
51-75%	12	13.6
75-100%	66	75.0
<b>Category of Residential Work</b>		
Spec	19	21.3
Custom	66	74.2
Other	4	4.5
<b>Client Age Range</b>		
20-30	1	1.1
31-40	36	40.9
41-50	43	48.9
over 50	8	9.1

Table 2

Mean Responses to the Facts on Aging Quiz II

Statement	Response Percent		
	True	False	Don't know
1	<u>91</u>	7	2
2	<u>92</u>	7	1
3	46	<u>36</u>	18
4	64	<u>27</u>	9
5	6	80	14
6	<u>10</u>	72	18
7	2	<u>93</u>	5
8	55	<u>21</u>	24
9	<u>43</u>	48	9
10	<u>31</u>	40	29
11	38	<u>44</u>	18
12	72	<u>18</u>	10
13	<u>89</u>	1	10
14	89	3	8
15	6	<u>83</u>	11
16	70	<u>18</u>	12
17	<u>36</u>	42	22
18	<u>63</u>	17	20
19	15	<u>73</u>	12
20	39	<u>45</u>	16
21	<u>19</u>	64	17
22	<u>67</u>	8	25
23	1	<u>93</u>	6
24	56	<u>33</u>	11
25	31	45	24
	Mean	Standard Deviation	
FAQII-Knowledge	12.516	3.506	
FAQII-Attitude (Net-bias)	-24.97	19.311	

Note: Underlined values represent correct answer for that statement.

Table 3

Pearson Correlation for Awareness and Use of Accessible Products,  
the Facts on Aging Quiz II and Independent Variables

	1	2	3	4	5	6	7
1. Use	1.00	.72785 .0001*	-.0091 .9347	-.1084 .3296	-.0733 .5130	.0501 .6529	-.0324 .7712
2. Awareness		1.00	-.0246 .8508	.1642 .1285*	-.1604 .1403**	-.0052 .9632	-.0236 .0271*
3. FAQII-Knowledge			1.00	.01611 .8804	-.0528 .6249	.0967 .3672	.0828 .4403
4. FAQII-Attitude (Net-bias)				1.00	-.2682 .0115*	.0674 .5302	-.0989 .3562
5. Age					1.00	.14921 .1653	.6545 .0001*
6. Education						1.00	.0230 .8307
7. Tenure							1.00

Note: N = 89

\* p < .05

\*\* p < .15

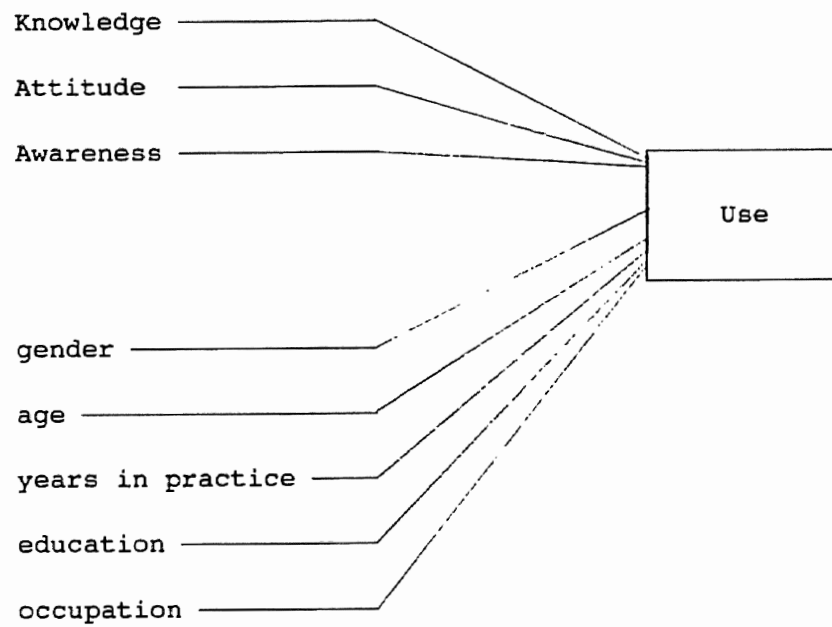


Figure 1. Model to Examine the Independent Variables as Predictors of Use of Accessible Features

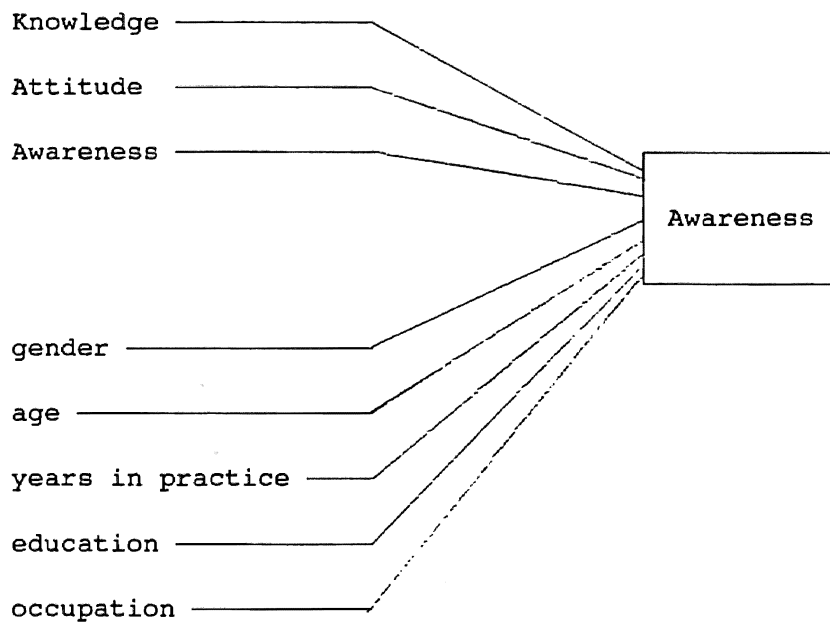


Figure 2. Model to Examine the Independent Variables as Predictors of Awareness of Accessible Features



VITA <sup>2</sup>

Suzanne Heyward Belser  
Candidate for the Degree of  
Master of Science

Thesis: HOME BUILDER'S ATTITUDE AND KNOWLEDGE OF AGING: THE  
RELATIONSHIP TO DESIGN FOR INDEPENDENT LIVING

Major Field: Family Relations and Child Development

Biographical:

Personal: Born in Columbia, South Carolina, July 12, 1954, the daughter of Irvine Furman Belser Jr. and Gladys Baker Belser. Married William J. Muldoon, May 1981. One son, James Heyward, born July, 1989.

Education: Graduated from A.C. Flora High School, Columbia, South Carolina, 1972; received Associate of Applied Science in Interior Design, Award for Excellence in Interior Design, from Bennett College, Millbrook, New York, 1974; received Bachelor of Environmental Design in Architecture, magna cum laude, from North Carolina State University, Raleigh, North Carolina, 1980; completed requirements for the Master of Science degree at Oklahoma State University, December 1993.

Professional Experience: Architectural draftsman,  
Architectural Project Manager, Project Architect,  
1981-1989.

Professional Affiliations: American Institute of Architects, member 1980-present; Associate Chapter President, Ventura, California, 1982-1983; Sigma Phi Omega, National Academic Honor and Professional Society in Gerontology, member, 1990-present; past chapter secretary 1990-1993; American Society on Aging, member 1991 to present; Kappa Omicron Nu Honor Society, member, May, 1993 to present.

OKLAHOMA STATE UNIVERSITY  
INSTITUTIONAL REVIEW BOARD  
FOR HUMAN SUBJECTS RESEARCH

Date: 06-03-93

IRB#: HES-93-031

Proposal Title: HOME BUILDERS ATTITUDE AND KNOWLEDGE OF AGING:  
THE RELATIONSHIP TO DESIGN FOR INDEPENDENT LIVING

Principal Investigator(s): Joseph Weber, Suzanne Belser

Reviewed and Processed as: Exempt

Approval Status Recommended by Reviewer(s): Approved

APPROVAL STATUS SUBJECT TO REVIEW BY FULL INSTITUTIONAL REVIEW  
BOARD AT NEXT MEETING.  
APPROVAL STATUS PERIOD VALID FOR ONE CALENDAR YEAR AFTER WHICH A  
CONTINUATION OR RENEWAL REQUEST IS REQUIRED TO BE SUBMITTED FOR  
BOARD APPROVAL. ANY MODIFICATIONS TO APPROVED PROJECT MUST ALSO  
BE SUBMITTED FOR APPROVAL.

---

Comments, Modifications/Conditions for Approval or Reasons for  
Deferral or Disapproval are as follows:

Signature:

*Maria S. Tilley*

Chair of Institutional Review Board

Date: June 4, 1993