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OLDER ADULTS RESIDING IN THEIR OWN HOME: PRIORITIZING HOUSING INADEQUACIES

Ruth Stumpe Brent, Ronald G Phillips, Edward E Brent, Millend K Gupta, and Susan Ray Degges.

Abstract

A housing assessment centered on issues of safety, function, and comfort was conducted in the homes of 90 older adults. Findings document the frequency of home-environment liabilities and the location of housing inadequacies. Housing inadequacies relating to gross motor safety are the greatest concern and occur most frequently in the bathroom and kitchen. Included is a theoretical model that illustrates a priority for housing inadequacies by type of home-environment liability and location. Recommendations are suggested for housing designers, providers, and those who counsel and advise older adults.

Introduction

As older people experience age-related impairments, the fit or compatibility between the individual and their home environment deteriorates (Kahana, 1982). This incongruence in the home environment can impede independent living. Older adults experiencing age-related impairments in mobility, vision, or balance are particularly vulnerable to the effects of housing inadequacies.

Housing inadequacies may be in the form of safety hazards, functional barriers, or challenges in the home that limit personal comfort. Because incongruence in the home environment can impede independent living, research is needed to identify problem zones and to advance practical solutions.

This descriptive research develops information useful in preventing accidents and in promoting home-environment wellness, independence, and comfort among older adults. By eliminating housing inadequacies, it may be possible to delay institutionalization and enhance the quality of life among the elderly.

The objectives of this research are to identify and prioritize housing inadequacies by type, frequency, and location. A comprehensive home assessment is used to collect the data (Brent and Brent, 1987)

Background

Research indicates that people prefer to stay in their own homes as long as possible (AARP, 1987). As the incongruence between the elderly and home environment increases, so does concern for this group's health, safety, comfort, and the ability to function in the home. The various domestic impediments that threaten these aspects of independent living are the home-environment liabilities.

Falls, in particular, are often a result of impediments in the home environment. About one third of all falls and 60 percent of all fatal falls occur in the home (Sorock, 1988). Epidemiological research has also been conducted to identify and enumerate risk factors related to falls (Nickens, 1985; Sorock, 1988; Tinetti, Speechley, and Ginter, 1988).

Ruth Stumpe Brent is the Department Chair and Ronald G Phillips is an Assistant Professor of Environmental Design at the University of Missouri in Columbia. Edward E Brent is a Professor of Sociology at the University of Missouri. Millend K Gupta is an Assistant Professor of Textiles, Merchandising, and Design at the University of Tennessee in Knoxville. Susan Ray Degges is an Assistant Professor in Home Economics at the University of Central Arkansas.

This research suggests the risk of falling increases in proportion to the number of risk factors. Other elements in the equation may be the accumulative effect of multiple disabilities plus things such as medication and cognitive impairment (Tinetti et al., 1988). Other predisposing health dysfunctions include disability of the lower extremities, palmomental reflex, balance-and-gait problems, foot disorders, and other neurologic and musculoskeletal functions that relate to physical stability (Tinetti et al., 1988). In addition, poor vision is associated with falling (Tobis, Nayak, and Hoehler, 1981). A study of reported falls among 336 persons 75 or older who were living independently in the community, found that one in ten falls occurred during acute illness; one in twenty during hazardous activity; and two of five in the presence of environmental hazards (Tinetti et al., 1988).

Although age, health, and illness may contribute to increased risks, the dwelling also plays a role. Older adults often reside in homes in need of maintenance. Many of these maintenance items pose home-environment risks that threaten the safety of older adults and can lead to premature institutionalization. Tripping over objects, for example, is more common at ages 65 to 74 than among older groups (Sorock, 1988). According to Sorock (1988), individual health differences after age 75 may be more important than home-environment factors in causing falls. Epidemiological research has explained the health liability of falling (Nickens, 1985; Sorock, 1988; and Tinetti et al., 1988). Additional research, however, is needed to determine and explain the specific home-environment liability for falling and for other accidents in the home. Available research on falls among the elderly suggests that homes for this population should be responsive to safety hazards such as step-stools, throw rugs, slippery floor surfaces, and poorly lighted areas.

In an examination of falls among older adults, Sorock (1988) found that falls at home account for the most number of deaths at home. The fatalities are often related to stairs. In the United States, 60 percent of fatal falls take place in the home. Comparable statistics on fatal falls by location have also been found in England, Wales, and Scotland (Sorock, 1988).

According to the economic model devised by Struyk and Katsura (1988), older adults avoid moving by adjusting their housing in various ways. Specifically noted are repairs, improvements, and modifications to the dwelling, plus changes in room use and by taking in a boarder. In a sample of 187 households headed by a nonelderly person and 177 households headed by an elderly person, data are given on the incidence of housing adjustments. Ten percent of the elderly headed households made modifications to assist an impaired person within the last two years. Only five percent of the nonelderly headed households made such modifications (Struyk and Katsura, 1988). The research explored possible barriers to housing adjustments but did not identify common housing inadequacies.

Brent, Lower-Walker, and Twaddell (1983) found that a large proportion of older adult housing had critical design problems. Many of these problems posed serious hazards and disrupted functioning yet could be corrected inexpensively. Perhaps these solutions have been overlooked because older people are accustomed to adapting to impediments and have not seen housing problems or inadequacies which have occurred gradually. The lack of housing maintenance among older adult households or the residents' own changing mental and physical competence may be responsible for this situation. Whatever the underlying cause, housing deficiencies reduce the ability of older individuals to cope with a home environment that once was not a problem.

Among older adults who buy homes, adaptable home-design features that emphasize safety and comfort are seen as valuable. From a poll of 603 Florida residents 54 years of age and older, nearly two thirds said they would pay $1,400 to have 12 designated design features in a new home. About one fourth of these residents worked full or part time. One in five lived alone. One in ten lived in rented housing and about two in five had been living in their current residence for 11 or more years. The 12 designated items

the Florida residents preferred to have in a new home were: Kitchen: 1) single-lever faucet, 2) customized pantry, 3) nonslip floor; Bathroom: 4) grab bars, 5) non-slip floor, 6) single-lever faucet, 7) extra-wide door; Outdoor entrance: 8) nonskid sidewalks, 9) extra-wide door, 10) levered dead-bolt locks, 11) covered porch, and, 12) shelf by front door (Giese, 1989).

Typically, older adults are dependent upon their environments at various levels. With improvements made in their home environment, they increase their capacity to function within and structure their habitat. This improved living space offers restorative potential (Lindsey and Hughes, 1981). Independence is enhanced if the elderly individual can remain in the community and in his or her own dwelling. That elderly individuals are fiercely independent and desire to manage on their own is well documented (Cantor, 1989).

The most economical way to provide adaptable housing for all ages is to build new homes that way. Similarly, if housing is designed to accommodate persons of all ages and of diverse levels of handicaps in general, the cost of retrofitting for specific adaptations would be less. Adaptable housing eliminates any special appearance and can be modified to meet the needs of residents by adding or adjusting features. For example, adaptable housing offers attractive and marketable units which accommodate the need for a clear knee space and grab bars as tenants need them.

To promote adaptable housing the American Society of Interior Designers (ASID), makes the following recommendations:

Increase awareness, dialogue, and study of adaptable housing,

Affect community action to support adaptable housing,

Encourage research on the creation of new methods for providing adaptable features,

Promote interagency dialogue (i.e., American National Standards Institute and others) to bring expert knowledge to the project,

Advance the design of adaptable features to meet the changing needs of a diverse clientele and to meet compliance with laws, regulations, and life-safety requirements, and

Promote industry cooperation for the development and use of adaptable features (ASID-2, 1989).

Gunn (1988) argues that the design features and interior components that foster independent living for individuals with disabilities also provide greater convenience and safety for all ages. As a result of a cooperative effort between housing researchers and the design community, this notion was articulated in the ASID position on universal design:

> Universal considerations for design" advocates the critical need for a sensitive and informed approach to designing for all people. Designing for all people expresses a respect and understanding of the diverse uses made of interior spaces because of differing needs and activities which are determined by gender, race, culture, age, physique, socioeconomic status, health status, social roles, lifestyles, and familiar status. "Universal considerations for design" expands horizons, moving beyond uninformed social and technical assumptions, stereotypes and stigmas, to advance the quality of life for meaningful inhabitation (ASID-1, 1989).

With this position, there is interprofessional cooperation in setting a future orlented standard for the optimal housing of all people. Such a position may further be explicated with a theoretical model as described below.

Prioritizing Housing Inadequacies Model

The study builds upon a structural/functional theoretical perspective. The focus is on the interactions of elderly individuals living in their own home, the group of older adults who have health and environmental liabilities, and the larger society concerned about their health, safety, and welfare. Furthermore, there is concern for how the numerous housing needs of older adults can be met by adapting existing housing and persuading designers and providers of new housing to implement universal considerations for design.

Maslow's hierarchy of needs (1954) illustrates a prioritizing of needs for survival. This study concentrates on a similar priority of health and environmental needs for older adults to survive in their own home. Unlike previous research, housing inadequacies are identified, prioritized, and described by the type of health and environmental liability. Frequencies and room locations of housing inadequacies are also given.Two theorists, Maslow (1954) and Bennett (1977) have described a hierarchy of needs comprised of levels ranging from the lowest, physiological needs, to the highest, self-actualization. Maslow's hierarchy has five levels, ranging from physiological needs to self-actualization. The Bennett hierarchy details design criteria, ranging from safety to aesthetics. Both hierarchies suggest that individuals must meet their most fundamental needs first, before proceeding to the next level of need.

Borrowing from the ideas of Maslow and Bennett, a model is advanced which captures the complexity of housing inadequacies for older adults. Figure 1 illustrates the hierarchy of needs for home-environment design for older adults. It emphasizes three components--safety, function, comfort.

This three-level framework is a conceptual model for systematically prioritizing and examining housing needs of older adults. It builds on the needs identified in the literature. For example, Barrow (1986) writes that older adults need housing that offers safety and comfort in a convenient, desirable location and at a cost within their budgets. The proposed three-level framework incorporates these needs. As illustrated in Figure 1, greater concern is placed on lighting and electrical inadequacies that relate to safety than on function or comfort.

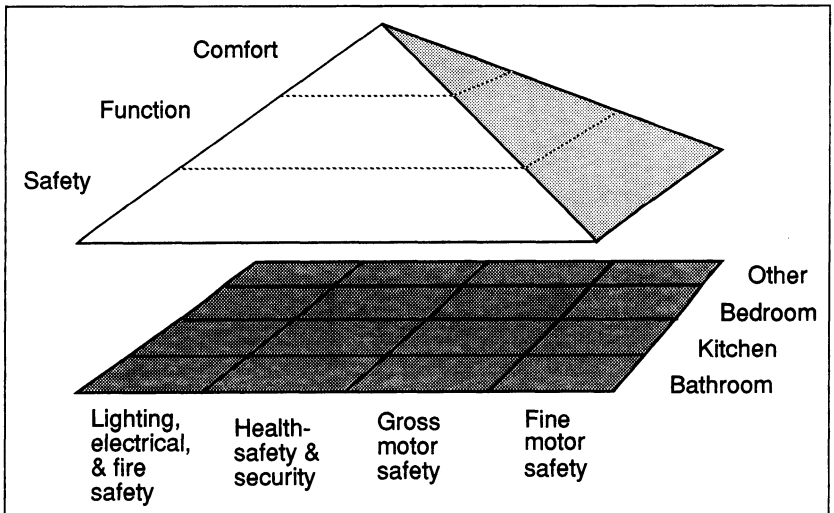

Figure 1. Prioritizing housing inadequacies model.

The model recognizes the person-environment fit of housing needs for older adults (Lawton, 1970) and categorizes the environmental liabilities that threaten the safety of older people. An older adult's housing situation is a dynamic process; as health status declines with age, the need for a more supportive environment increases.

Home-environment factors have a greater impact on individuals who have experienced a decline in their biological health, sensorimotor functioning, cognitive skill, and ego strength (Lawton and Simon, 1968; Lawton, 1972). As a person ages, there are numerous physical and psychological health changes. The environment has a much greater influence on older adults' capabilities to function independently than that of younger adults. The independence of an older adult should not be unnecessarily threatened because of declining health. As inadequacies increase in the homes of older adults, the fit between the individual and the home environment becomes more problematic. There may be a decline in an individual's competence in the home due to limitations in health, cognitive skills, ego strength, social status, and social role performance (Pastalan and Carson, 1970). The model offers the systematic analysis of housing inadequacies and liabilities that threaten older people. The categories are 1) fine motor safety, 2) gross motor safety, 3) health safety and security, and 4) lighting, electrical, and fire safety.

Methods

This research was funded in part by a University of Missouri Institutional Biomedical Research Support Grant from the National Institutes of Health; The Idea Works, Inc. of Columbia, Missouri; and by the American Society of Interior Designers Environmental Design Award. One hundred older persons aged 60 or older were selected to participate in two companion studies identifying housing inadequacies. As noted, the assessment focused on inadequacies in three areas: safety, function, and comfort.

Housing assessments were conducted in two phases with a sample of 50 residents participating in each. Of the 100 cases sampled, 90 residents agreed to complete the assessment. There were 44 cases in the first phase and 46 cases in the second. The median age of the sample was 74. Just over 60 percent lived alone. About 90 percent were female. Over 80 percent of individuals participating in the second sample reported incomes between $5,000 and $9,999. Names of respondents were obtained through referrals and local agencies such as Meals on Wheels, Housing Development Agency, and the Public Housing Authority. The sample of respondents from the first phase were obtained through nonprobability sampling methods in a small rural community. The names of elderly heads of households were obtained through local agencies associated with older adults and through referrals from research participants. Respondents in the second phase were participating in a home-repair program funded by the Community Development Commission and the local City Council in a midwestern city with a population of 65,000. Participants were low-income residents who lived at home. The two samples were not significantly different, so the results were pooled for a single, summary analysis. Both samples were composed primarily of middle to lower income rural, small-town, older adults.

When more than one individual resided in the home to be assessed, the person with greatest health problems was interviewed. The interviewer was familiar with Lawton's Activities of Daily Living scale (1972) to make this determination. The reasoning behind this decision was that the individual who is at greatest risk of institutionalization is also most vulnerable to home-environment hazards.

A comprehensive computerized program called the Elderly Resident Housing Assessment Program (ERHAP) was used to identify housing inadequacies (Brent and Brent, 1987). The computer program systematically utilizes over 300 rules in the field of environmental gerontology for conducting an assessment. Examples of rules utilized are described in "ERHAP: An Artificial Intelligence Expert System for Assessing the Housing

of Elderly Residents" (Brent and Brent, 1987). Questions are organized by room to facilitate a room-by-room, walk-through assessment. The program identifies potential housing problems that may be a hazard now or in the foreseeable future given an individual's unique health profile.

The ERHAP is developed under the expert system shell (EXSYS), a commercial software program for developing expert systems. Expert systems are programs which use knowledge of the specific, substantive domain to examine problems (Benfer, et al., 1991). This permits the program to reach conclusions much like those a human expert would reach when faced with a comparable problem.

The assessment was conducted by a designer trained in environmental gerontology. The first phase utilized two design experts, an architect and an interior designer. Both were trained to examine the photographs of resident housing to validate the computer program. During this trial phase, the experts tried to find problems that the program did not pick up. The second phase of the study implemented a revised computer program to collect the data during the home assessment.

Each home assessment took approximately one hour and fifteen minutes. The assessment tour included the interview protocol and identification of inadequacies in the home. Photographs were also taken in both phases to document particular problems for further analysis. After this analysis, a written report was given to the individual participant listing problems and recommendations for improving their home. Although participants were under no obligation to make changes, the recommendations provided design-program information for families and social service agencies. Because participation in the second phase was funded by the Community Development Commission and the local City Council, all cases in this phase participated in a home-repair program.

Findings

In examining the homes of older adults, features categorized as safety inadequacies such as throw rugs or electrical cords across a traffic path, were found more frequently than function or comfort problems. It was difficult, however, to separate inadequacies in terms of safety, function, and comfort. Paradoxically, the hierarchical model described earlier seemed a useful tool in prioritizing needs. Yet, safety inadequacies often contributed to an individual's capacity to function in their home and, as a result, contributed to their overall comfort. For example, when kitchen cabinets were too high to use, the concern was for both safety and function. The same example can be extended to blur the lines among all three categories. Using a step stool to reach kitchen cabinets is simultaneously a safety concern, a function concern, and a reduction in comfort.

The housing inadequacies identified are specific to the health status of individuals. The bathroom-assessment questions, for example, are answered on the basis of individual health status. Although it identifies safety concerns such as the lack of a fire extinguisher or smoke alarm, the program is geared to highlight universal design considerations. Hence, much attention is given to an individual's limitations regarding reach, mobility, vision, balance, hearing, sensitivity to minor variations in temperature, weakness in the lower extremities, dizziness when bending, tiring easily, memory difficulties, and dexterity. An in-depth explanation of the program's content and scope is detailed in "ERHAP: An Artificial Intelligence Expert System for Assessing the Housing of Elderly Residents" by Brent and Brent (1987).

The study utilizes descriptive comparative analysis to identify housing inadequacies. These are shown in Tables 1 through 4. Inadequacies were most often found in the bathroom and kitchen. However, this needs to be interpreted cautiously because the same questions were not asked for every room. The bathroom and kitchen were found to be the most environmentally challenging to respondents. These two rooms incorporate the largest number of activities which occur in the home--maintaining personal hygiene and performing food-preparation tasks.

The specific inadequacies are listed by the percentage of occurrence. The most common inadequacies in bathrooms are shown in Table 1.

The most common inadequacy related to the bathroom door swing. Perhaps this is a common problem because federal guidelines recommending an outward swing are relatively recent.

The bedroom seems to have fewer housing inadequacies than the bathroom and kitchen. Table 3 gives mean scores of reported common inadequacies for the bedroom.

Table 1. Bathroom inadequacies (N=90).

Inadequacy	Percentages
Door swings into bathroom instead of swinging out	85
Inadequate grab bars near the bathtub or shower	82
No seat in the tub or shower	80
No ground-fault circuit interrupter	74
Inadequate light over tub or shower	69
Drawer pulls difficult to manipulate	38
Throw rugs	42
No nonslip bathtubs	25

Table 2. Kitchen inadequacies (N=90).

Inadequacy	Percentages
No fire extinguisher	80
Step-stool used	66
Top kitchen shelf higher than reach	63
Drawer difficult to manipulate	33
Cabinets too deep	33
No smoke alarm	29
Insufficient general illumination	27
Pests and rodents	22
Inadequate countertop lighting	22

Table 3. Bedroom inadequacies (N=90).

Inadequacy	Percentages
Throw rugs	66
No smoke alarm	56
No nightlight	56
No portable light near bed	46
Bed height	45
No phone by bed	33

Table 4. Other inadequacies (N=90).

Inadequacy	Percentages
Manipulating window controls	59
Difficult to keep doors open or closed	41
No deadbolt locks	35
No peephole on front door	33
No handrails on stairs	21

Table 4 gives percentages of occurrence for other inadequacies which were not tied exclusively to a particular room of the house. The most common inadequacy in this category related to opening and closing windows.

Home-Environment Liabilities

As illustrated in Figure 1, housing inadequacies emphasized safety hazards in the home. The identified housing inadequacies were then analyzed by four major types of health and home-environment liabilities that threaten the safety of older adults. The liability types are:

1) Fine motor safety: These problems affect grasping, reaching, turning, and manipulating controls.

2) Gross motor safety: These problems affect maintaining ones' balance in standing and walking; closing and opening doors; using the bathtub or shower; getting in and out of bed; and walking up and down stairs.

3) Health safety and security: These problems relate to pests and rodents and security against intruders.

4) Lighting, electrical, and fire safety: These problems entail electrical shock, fire, and the array of problems that may occur when insufficient light is available.

These are shown in Tables 5 through 8. Overlap between categories is recognized. Insufficient light, for example, may result in falls, burns, and inability to use a knife safely on a countertop for chopping fruits and vegetables.

Examining housing inadequacies by category shows that the most, 11 inadequacies, relate to gross motor activity. The category with the second most, 8 inadequacies, was lighting, electrical, and fire safety. Health safety and security was next followed by fine motor safety.

The relative high percentages of lighting, electrical, and fire safety inadequacies is explained by the age and ownership of the housing stock being evaluated. The housing is owned by middle to lower income older adults and there is need for home repair.

Percentages shown in Table 6 indicate that throw rugs are a greater danger in the bedroom, 66 percent, than the bathroom, 42 percent. Table 8 also indicates that smoke alarms are needed more in the bedroom, 56 percent, than the kitchen, 29 percent.

Table 5. Fine-motor safety inadequacies in percent (N=90).

Inadequacy	Bathrm	Kitchen	Bedrm	Other
Drawer difficult to manipulate	38	33	--	--
Manipulating window controls	--	--	--	59

Table 6. Gross-motor safety inadequacies in percent (N=90).

Inadequacy	Bathrm	Kitchen	Bedrm	Other
Door swings into bathroom instead of out	85	--	--	--
Inadequate grab bars near tub/shower	82	--	--	--
No seat in tub or shower	80	--	--	--
Throw rugs	42	--	66	--
No nonslip bathtub	25	--	--	--
Step-stool used	--	66	--	--
Top kitchen shelf higher than reach	--	63	--	--
Cabinets too deep	--	33	--	--
Bed height	--	--	45	--
Doors difficult to open or keep open/closed	--	--	--	41
No handrails on stairs	--	--	--	21

Table 7. Health-safety and security inadequacies in percent (N=90).

Inadequacy	Bathrm	Kitchen	Bedrm	Other
Pests and rodents	--	22	--	--
No deadbolt locks	--	--	--	35
No peephole on front door	--	--	--	33
No phone by bed	--	--	33	--

Table 8. Lighting, electrical, and fire-safety inadequacies in percent (N=90).

Inadequacy	Bathrm	Kitchen	Bedrm	Other
No ground-fault circuit interrupter	74	--	--	--
Inadequate light over tub or shower	69	--	--	--
No fire control extinguisher	--	80	--	--
No smoke alarm	--	29	56	--
Insufficient general illumination	--	27	--	--
Inadequate countertop lighting	--	22	--	--
No nightlight	--	--	56	--
No portable light near bed	--	--	46	--

Conclusions

Older adults living in their own home are confronted with numerous housing problems that threaten their safety. In this study housing inadequacies were identified in different rooms of the home and were analyzed by type. As the hierarchy in Figure I illustrates, safety is more critical than function and comfort. Research findings show that safety in the bathroom and kitchen of older adults needs more attention. Health and home-environment liabilities relating to gross motor safety are most common.

Clearly the group of older adults who are most vulnerable to health and home-environment liabilities would profit from the findings in this study. Perhaps the following anecdote will best illustrate this point. After one home assessment, a resident told a future participant of the study to remove throw rugs before our researcher visited them. Oddly enough, the first participant slipped and fell on her own throw rug after telling her friend to remove them. Only then did she heed the advice and remove the throw rugs in her home.

Housing inadequacies that threaten older adults in their own home further impact the level of supplemental services needed to maximize independent living in the community. Simply stated, the purpose of this study is to prevent accidents in the home. This may help older adults stay in their own home as long as possible. Interprofessional cooperation among housing designers, providers, and those who counsel and advise older adults could help to achieve this goal.

A strong case can be made that universal considerations for design can be met through adapting existing dwellings and in the design of new housing. For the elderly, falls often entail long-term hospitalization, extensive aftercare, and great expense. The mental anguish for an individual and family cannot be calculated. An environmental wellness program that eliminates safety hazards is cost effective. Reducing environmental liabilities may also save some of the lives among the 1 1,600 deaths a year resulting from a fall (Nickens, 1985).

With so much at stake, designers, health care providers, and others should be vigilant to eliminate unsafe, housing inadequacies. There is new meaning to the truism "safety first."

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