



Barriers to the Initiation of Home Modifications for Older Adults for Fall Prevention

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Abstract

Introduction: Home modifications are associated with decreased risk for falls and facilitate safe aging in place. The purpose of this study was to identify barriers to procurement of home modifications for older adults. **Materials and Methods:** Cross-sectional interviews by 2 separate (1 male and 1 female) researchers in a Midwestern city of home repair (“handyman”) and construction businesses within 15 miles of the areas of interest (neighborhood with a high socioeconomic status and neighborhood with low socioeconomic status) with a publicly listed phone number (n = 98). Estimated cost, earliest date of installation, and duration for a home modification project (installation of 3 grab bars) were collected. **Results:** At least 1 response was attained only 43% of the time (n = 42), and residential grab bar installations were not provided by most businesses (n = 24). The average quote for materials and labor was \$394.31 (range \$125-\$1300). Five of the 7 businesses that responded to both researchers with the same representative differed in cost estimates, generally offering a reduced quote for the low socioeconomic status neighborhood by as much as \$300. Quotes provided to the female researcher were also higher than those obtained by the male researcher by about \$30 regardless of socioeconomic status. The average wait for home modifications was 23 days and the average anticipated duration of the project was 2.6 hours. **Discussion:** There are financial and procedural barriers to accessing home modifications for older adults who independently attempt to acquire them. There is a need for pathways in clinical and community settings to reduce barriers to home modifications to reduce the risk of falls. **Conclusion:** Home modifications are a promising tool to reduce falls and fall-related injuries in older adults. However, further work to identify cost-effective and timely options to reduce acquisition barriers is necessary to leverage the preventive power of home modifications.

Keywords

fall prevention, home modifications

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Introduction

Falls are a leading cause of fatal and nonfatal injury among older adults in the United States,¹ with more than 1 in 4 adults age 65 and older falling each year.² The rate of falls varies with sex, age, and race.³ Female sex, increasing age, and white race are associated with higher risk for falls.⁴⁻⁷ Falls are a heavy economic burden, with annual costs exceeding \$50 billion for non-fatal fall injury medical costs and an additional \$754 million for fatal falls.⁸ In addition, falls may exhibit a cascading risk pathway, as a single fall may increase fear of falling leading to decreased physical activity, resulting in deconditioning and a subsequent greater risk of falls.⁹

Most fatal falls occur in the home,^{10,11} and the home environment is recognized as a factor in fall risk for older adults. Home modifications, such as grab bar installations, are a fall prevention approach that are associated with decreased falls and improved activities of daily living.¹² The presence of even a single indoor home modification is associated with a lower likelihood of a fall resulting in injury among disabled individuals, highlighting the effectiveness of home modifications for fall prevention.¹³ In addition, home modifications decrease the risk of physical deconditioning,¹⁴ reduce care needs and increase independence,¹⁵ decrease depression, are suitable for older adults with complex medical needs,¹⁶ and allow an older adult to age in place longer.¹⁷ A majority of older adults want to remain in their homes as they age,¹⁸ yet many older adults report not having the home modifications to make their residences safe and appropriate for their changing needs.^{19,20}

The Consumer Decision Model suggests that an individual's decision making process for deciding to have a home modification is complex and includes the factors of perceived susceptibility, severity, efficacy, and cost.²¹ One study found that among older adults who had fallen in the past year, over 70% did not believe they were at risk for another fall, indicating likely resistance to home modifications, and there is evidence to suggest that older adults do not view home modifications as likely to prevent falls.^{22,23} Once these barriers are overcome, and an older adult is willing to have a home modification to reduce their risk for falls, they must undergo the process of procuring the necessary alterations to their home, a topic that, to the authors' knowledge, has not been studied.

The purpose of this study was to identify potential barriers to scheduling home modifications, including identifying a contractor, cost, timing, and project duration. We additionally sought to determine if these factors would vary depending on the socioeconomic status (SES) of the location given for installation.

Materials and Methods

Home repair ("handyman") and construction companies within 15 miles of 2 residential zip codes in an urban Midwestern city with a publicly listed phone number were identified using Google search following approval from The Ohio State University Institutional Review Board (#2019B0555). The zip

Table 1. Characteristics of Neighborhoods Representing High and Low Socioeconomic Status (SES) for Home Modification Inquiries.

	Low SES neighborhood	High SES neighborhood
Percent of population with bachelor's degree or higher	10%	78%
Median household income	\$35,000	\$108,750
Poverty rate	35%	9.3%

*SES = socioeconomic status.

**Source of data for the low SES neighborhood was the city planning office; source for high SES was US Census.

codes represented one geographic area with a high socioeconomic status (SES) and one with a low SES [Table 1]. The lists of home repair and construction companies for each zip code were compared and only those within 15 miles of both zip codes were included in the study. The businesses were interviewed in separate calls by 2 researchers (A and B), 1 male and 1 female, 48 hours apart, on business days during normal business hours, with Researcher A always making the first call. A randomizer was used to assign either low or high SES for the first call and the other SES was allocated to the second call. Since falls in the home primarily occur in the bathroom¹⁰ and grab bars in a bathroom are one of the CDC's recommendations for older adults,¹ the researchers requested installation of 2 grab bars in a tiled shower and a single grab bar adjacent to a toilet using a script for standardization. The first name of the business employee was documented along with the estimated cost, earliest date of installation, and duration of project. During the phone call, businesses were not told the inquiry was part of research study to prevent biased responses.

Cost Estimates

A national home improvement company's site was searched for Moen ADA compliant grab bars (two 18" and one 24") and the expense ($2(\$19.97) + \$26.98 = \$66.92$) was added to the quotes that were for labor alone for comparison purposes.

Results

Ninety-eight businesses met inclusion criteria for the study. At least 1 response to researchers was attained only 42.8% of the time ($n = 42$), and only 18.4% of identified contractors provided residential grab bar installations ($n = 18$). Of the 18 businesses that provided grab bar installs in the area, 3 would not provide estimates or any other information without first seeing the space requiring modifications. The other businesses contacted that did not provide grab bar installations stated that they provided commercial services only ($n = 14$), did not give an explanation ($n = 5$), were too busy for new clients ($n = 2$), had specialized services (e.g., plumbing; $n = 2$), or did not service the area of inquiry ($n = 1$). Among non-respondents ($n = 56$), the majority did not answer either call from researchers, though some numbers were out of service ($n = 13$), others

Table 2. Estimates Provided by Same Business Representative for Neighborhoods of Differing Socioeconomic Status.

Businesses that provided estimates	SES of neighborhood	Study member	Cost	Days till install	Duration of project (hours)
1	Low	A	\$400.00	3	2
	High	B	\$400.00	Not provided	2
2	Low	A	\$166.92	84	1
	High	B	\$366.92	84	3
3	High	A	\$750.00	1	2
	Low	B	\$450.00	1	3
4	Low	A	\$450.00	79	8
	High	B	\$600.00	108	7.5
5	High	A	\$125.00	14	1.5
	Low	B	\$311.92	26	3
6	Low	A	\$150.00	7	2
	High	B	\$216.92	10.5	2
7	High	A	\$216.92	8	2
	Low	B	\$216.92	10.5	1.5

Table 3. Estimates Provided for Project by Socioeconomic Status of Neighborhood.

Estimate	High SES Average (n = 7)	High SES Range	Low SES Average (n = 7)	Low SES Range	Combined Average (n = 14)
Cost	\$382.25	\$125-\$750	\$306.54	\$150-\$450	\$344.39
Time to install	38 days	1-108 days	35 days	1-84 days	36 days
Duration of project	2.86 hours	1.5-7.5 hours	2.92 hours	1-8 hours	2.89 hours

*SES = socioeconomic status.

connected but were no longer associated with a home modification business (n = 3), and others were associated with a closed business (n = 2).

A total of 23 quotes from 15 unique businesses were obtained. The median quote for cost was \$394.31 with a range of \$125 to \$1300. Only 8 businesses responded to both inquiries by researchers, and 7 of these had the quote provided by the same business representative [Table 2]. Of the 7, 5 quotes differed, typically favoring the low SES neighborhood, by as much as \$300 [Table 3]. Quotes provided to the female researcher were also higher than those provided to the male researcher by about \$30 for both high and low SES inquiries. The average wait for installation was 23 days, and the average estimate for the length of the installation process was 2.6 hours.

Discussion

The results of this study suggest a barrier to home modifications for older adults is finding a contractor willing to complete the project, independent of evaluating their reliability or competency. While older adults or their caregivers could undertake home modifications on their own, costs as well as labor for those with physical or mobility limitations may prevent this. A further consideration is the importance of correct placement and installation of the proper equipment (e.g., adequate weight capacity) to enhance and not jeopardize the safety of the older adult, making this alternative unviable for most.

Considering many older adults experience economic insecurity,²⁴ costs for the home modifications may also prove a considerable barrier for older adults. Older adults—paradoxically, especially those who are affluent²⁵—can be reluctant to spend their incomes, and even the lowest quoted price of \$125 may be a perceived or real roadblock to home modifications. For older adults who require more substantial home modifications, the barrier of cost will only increase.

The average 23 day wait till installation of the home modifications may be a window during which the older adult may have a fall resulting in injury. Fall-related injuries vary in their severity, with consequences ranging from mild bruising and pain to a broken bone. However, an injury may occur such that the physical functioning of the older adult may shift and the proposed home modification is no longer sufficient. Therefore, such a long interval to installation may result in a fall that leads to decreased physical functioning, requiring more extensive modifications or loss of independence.

The estimated length of the project could also pose a barrier to receipt of home modifications by older adults. Home modification businesses typically operate during normal business hours. Although older adults report more leisure time than other age groups,²⁶ they still have commitments, including work, volunteerism, appointments, and familial or community obligations,²⁷ which may complicate coordination for installation. For older adults with physical or cognitive impairments, it may be necessary for a caregiver, family member, or friend to

be present during the installation, and this may create an additional layer of scheduling difficulty.

In addition to the barriers of access, cost, and time to installation identified in this study, there were variations observed between businesses as well as within the same business based on the SES of the neighborhood and the sex of the caller. The lack of standardization among businesses creates a context of asymmetric information where older adults may be vulnerable to predatory behavior or may be overwhelmed by the lack of available information and abandon the process of procuring home modifications.

Policy makers in the United States and abroad are thought to not fully appreciate the economic burden of falls.²⁸ The annual cost of falls exceeds \$50 billion, over 75% of which is covered by Medicare and Medicaid.⁸ In addition, medical costs associated with falls increase with the age of the older adult, making fall prevention an important economic as well as health priority. Evidence indicates that home modifications can be highly successful in mitigating risk for falls and also reduce Medicaid spending by up to \$867 per month per beneficiary when administered by an interprofessional team that evaluates individual ability and the home environment.²⁹ However, older adults appear to implement home modifications only when their fall risk is high, limiting their preventive ability. Additionally, there are disparities in utilization of home modifications, with Black and Hispanic households and individuals with less education or low social support being less likely to have home modifications.³⁰ These factors, in addition to the obstacles of cost, time to installation, and duration of installation identified in this study, suggest that increased access to home modifications could be powerful in making home modifications available to older adults who need them at a point when they can best be leveraged as preventive tools to reduce medical costs and increase independent living for older adults. Similar to financing streams that cover assistive technology devices, one option is for public funds to be invested in preventive care, such as home modifications, allowing for these features to be reimbursable expenses under Medicare and Medicaid. Care coordination from clinics, hospitals, or community-based resources such as community paramedics may also decrease barriers for older adults to facilitate timely and affordable acquisition of home modifications, although such efforts would require a framework for ensuring delivery and low or no-cost options since existing programs have found that in the absence of these factors, home modifications for fall prevention are not acquired.³¹

Limitations

This pilot study has several limitations. First, a single geographic area in the Midwest United States was included in the study. Second, there was overall a limited response to researchers and even fewer respondents to both researchers, so the difference in prices by SES and the difference in price quotes by sex of researcher that were observed may not be representative of

businesses in the area. In addition, the analyses for this study were limited to descriptive statistics.

Conclusion

The results of this study suggest that identifying and engaging a business to initiate a home modification project may be a challenge for older adults or their caregivers when seeking to implement home modifications to prevent falls. Variations in quotes for a project even from the same business may vary. Sex of caller and socioeconomic-related demographics of location for installation may be factors that could contribute to these variations, but additional work is needed to determine the extent to which these factors affect cost quotes. Further research is also needed to evaluate care coordination options through clinical and community pathways.



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