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Characteristics of Walking, Activity, Fear of Falling and Falls in Community Dwelling Older Adults by Residence

David M. Wert, MPT[1], **Jaime B. Talkowski, PhD, MPT**[1], **Jennifer Brach, PhD, PT, CGS**[1], and **Jessie VanSwearingen, PhD, PT**[1]

[1]Department of Physical Therapy, University of Pittsburgh

Abstract

Objectives—Research focusing on community dwelling older adults includes adults living in senior living residences (SLR) and independent community residences (ICR). Walking, physical activity, fear and falls may differ based on residence.

Purpose—We describe characteristics of walking, physical activity, fear of falling and fall history between community dwelling older adults by residence.

Methods—Participants of this secondary analysis included community dwelling older adults from independent living units within a senior life care community (SLR) and older adults recruited from the Pittsburgh community (ICR). Demographic information, physical (gait speed and physical activity), psychosocial (fear of falling and confidence in walking) and fall history measures were collected.

Results—Adults living in SLR compared to ICR were older, more likely to live alone and had greater disease burden. Compared to ICR, individuals in SLR reported less fear of falling (SAFFE fear .24 and .50 respectively). Fewer older adults in SLR compared to ICR reported falling in the past year.

Discussion—Older adults living in SLR compared to ICR had similar physical function but differed in report of fear of falling and fall history. Recognizing the possible differences in psychosocial function by place of residence is important for healthcare providers and researchers conducting interventions and studies for community-dwelling older adults.

Keywords

Residence; Gait; Fear; Falls; Older Adults

INTRODUCTION

Community dwelling older adults comprise a large portion of the general older adult population and are a significant part of ongoing research in aging.[1] One characteristic that differentiates community dwelling older adults from the general population of older adults is independence in daily activities and functioning; meaning they don't *require* the assistance of

Corresponding Author, David M. Wert, MPT, Department of Physical Therapy, University of Pittsburgh, 6035 Forbes Tower, Pittsburgh, PA 15260, ; Email: dlwert@verizon.net, Phone: 412-605-1474

another person in order to perform their basic day to day activities, like bathing, toileting, dressing, cooking, and light housecleaning.[2,3] Additionally, among the independent community dwelling older adults in our research, we recognized two groups, those in senior living residences (SLR) and those in individual community residences (ICR). We considered senior living residences to be carriage homes, apartment and room living in a senior facility or retirement community, with availability of services (i.e. meals, laundry, light housecleaning, transportation, internal and external housing maintenance) and adapted physical environments to promote mobility and reduce risk of injury.[4,5,6] Individual community residences were defined as more traditional home and apartment living, that does not include services as part of the home ownership or rental agreement. The primary reliance is on self, family, or friends for activities within the home and community.

The two groups, based on residence (SLR and ICR), are rarely distinguished in studies of community dwelling older adults[7-9] and established definitions of subgroups by residence has not been found. However, based on reports of how and why older adults choose a place of residence,[10,11] findings and interpretation of results may be influenced by differences in living environment for the two groups.

Social support and mobility often impact the decision of older adults to transition from a traditional, individual community home setting to a senior living environment[10,11] that, although independent living, has services to support daily living and is available as part of the residence. It is reasonable to expect, given the potential social and mobility based decision for the transition, that differences in physical (i.e. gait, physical activity) and psychosocial (fear of falling, confidence) characteristics may exist between the two groups. Researchers, who report on physical and psychosocial outcomes of community dwelling older adults, may misrepresent this subgroup of older adults due to differences in physical and psychosocial function based on type of residence. Understanding potential differences in performance by residence may be important in selecting older adults most appropriate for a study and accurately interpreting results.[12]

Observing SLR and ICR differences within one of our intervention studies, we were interested in exploring the apparent differences. We performed a secondary analysis and examined the baseline data for physical and psychosocial characteristics and fall history of two samples of community dwelling older adults with mobility disability. We expected the older adults living in SLR compared to those living in ICR to have poorer walking abilities, be less physically active, more fearful of falling, less confident with walking, and report more falls.

METHODS

Design

We performed a secondary analysis of the baseline data from our recent intervention studies[13] of independent community dwelling older adults with mobility disability. The investigations, whose aim was to improve walking, compared two interventions; 1) traditional impairment-based program of endurance, strength and balance training versus 2) a motor learning program that promoted smooth, automatic movement and movement

adaptations to altered conditions. Inclusion and exclusion criteria for the intervention studies were the same and baseline measures were collected in a single session.

Participants

Participants for this secondary analysis of community dwelling older adults served as the two primary samples for the intervention study[13] whose aim was to improve walking. The intervention study was performed at a senior living facility for independent older adults and at the Senior Mobility Aging and Research Training (SMART) Center at the University of Pittsburgh. All older adults living in the senior living facility served as the SLR group (n=18, mean age 83.9 years, 83% female). The sample of older adults from the SMART Center served as the ICR group (n= 41, mean age 77.5 years, 61% female). All participants consented to participate in the study and protocols were approved by the University of Pittsburgh IRB.

In order to be eligible for participation, an individual must have met all of the following inclusion criteria: 65 years of age and older, ambulatory with an assistive device other than a straight cane and without the assistance of another person, have written approval/clearance from their physician to participate in low to moderate intensity, supervised exercise, and have difficulty with walking or balance as indicated by mild to moderate slowing of walking speed (between .6m/s and 1.0m/s) and variable gait (step length coefficient variability >4.5% or step width variability <7% or >30%). Additionally, individuals were excluded if they had: dyspnea at rest or used supplemental oxygen, had acute illness or uncontrolled cardiovascular disease, had diagnosed dementia or cognitive impairment defined as a Mini Mental State Examination score <24, were recently hospitalization for cardiac reasons or for any reason greater than 3 days, had hemiparesis with lower extremity strength <4-/5 (MMT grade), had a fixed or fused lower extremity joint or amputation, or had a progressive motor disorder such as Multiple Sclerosis or Parkinson's Disease.

Measures

Demographic information collected during the study included, age, level of education (none, elementary, high school, college, graduate, other), gender, race, living arrangement (lives alone: yes or no) and number of co-morbidities (Comorbidity Index, 0= minimum and 18 = maximum number of co-morbidities per person). Gait speed and self-reported performance based measures, described below, were collected by physical therapists experienced with the measure.

Physical Measures

Gait Speed: Gait speed was measured using the GaitMat II (EQ Inc, Chalfont, PA), a computerized walkway approximately 6 meters in length with the middle 4 meters for data collection. Participant's walked at usual, self-selected walking speed on the instrumented walkway for two practice walks, followed by two passes for gait characteristic data collection.[8,12]

Physical Activity: Physical activity was recorded using an accelerometer (ActiGraph GTIM, Actigraph, LLC, Fort Walton Beach, FL), an electronic sensor for recording and storing the intensity, frequency, pattern, and duration of ambulatory physical activity.[9,14-16]

Accelerometers were attached to clothing at waist level over the dominant hip, during waking hours for seven consecutive days. Physical activity was calculated as the mean over 7 days of the average counts/minute worn (CPM). Accelerometer data has been validated in both laboratory and free living conditions as a measure of physical activity. [17-19]

Activity and Activity Restriction: The Activity Subscale and Activity Restriction Subscale of the Survey of Activity and Fear of Falling in the Elderly (SAFFE) is an interviewer administered instrument for measuring fear of falling and activity/activity restriction in basic and instrumental ADL's related to fall-related fear.[20] The activity subscale (score 0 – 11) is represented by the number of activities out of the eleven, that they currently participate in , while activity restriction is the sum of activities reported as having been done less over the past 5 years (0 – 11).

Psychosocial Measures

Fear of Falling

1. Fear Subscale: The SAFFE Fear Subscale was used as one indicator of fear of falling. The SAFFE fear subscale is mean score for fear across the 11 activities (0, not worried to 3, very worried). Scale validation was reported by Lachman et al. (1998), showing that SAFFE fear score was significantly correlated with Tinetti FES scale and one-item afraid of falling question.[20] Additionally, construct validity was obtained by Lachman et al. (1998) by looking at fear in relation to activity restriction; higher fear scores equated with greater activity restriction.[20] Howland et al. (1993) reported values of SAFFE fear that distinguished level of fear and degree of activity restriction; values greater than .40 significantly defined adults as being fearful.[20,21] Lachman et al. (1998) reported mean SAFFE fear of falling subscale score of 0.66 (sd = .69) for community dwelling older adults in public senior housing developments, n=270.[20]

2. Fear of Falling: Yes or no response to, “Are you afraid of falling?” was used as the second indicator of fear of falling. [22,24]

Confidence in Walking: The Gait Efficacy Scale (GES) was used to measure confidence in walking over various surfaces and conditions. Item scores (1 = no confidence to 10 = complete confidence) for each of the 10 conditions are summed for a total GES score ranging from 10 to 100, and previously validated as a measure of confidence in walking.[23]

Fall History: Participants reported the number of falls experienced in the past year; 1 or more falls classified as a positive fall history.

Statistical Analysis

Descriptive statistics were performed to describe characteristics of the older adults by residence. Independent t-tests for continuous data and Chi Square for categorical data were

calculated to test for differences in measures between individuals in SLR and ICR, with the significance level set at .05 a priori (SPSS version 14.0).

RESULTS

Participants differed by residence for age, living arrangements, and number of comorbidities (Table 1). Older adults in SLR were older, more likely to live alone and had more comorbidities. Similarities between the SLR and ICR groups also existed; participants were primarily Caucasian, female, and with ≥4 years of college education.

Physical Measures

All older adults studied walked slowly, with gait speed similar for older adults in SLR compared to ICR. Likewise, physical activity and SAFFE activity were similar for older adults in SLR and ICR (Table 2).

Psychosocial Measures and Fall History

Individuals in SLR compared to ICR reported less fear of falling with 22% (4/18) of older adults in SLR and 54% (22/41) of older adults in ICR scoring fearful (≥ .40)[20,21]. Fewer older adults in SLR compared to ICR reported falling in the past year (Table 2). There was no difference in walking confidence between groups.

DISSCUSSION

As expected, older adults in SLR compared to ICR, were older and had greater disease burden. The findings are consistent with a previous study that examined differences among older adults across various living environments.[25] We did not expect the older adults in SLR, with greater disease burden and older age, to have similar gait speed and physical activity as their counterparts in ICR, nor did we expect those in SLR to report less fear of falling, and have a lower percent reporting falls compared to ICR. The unexpected differences in physical function and psychosocial aspects may be an impact of the differences in residential environment.

In previous studies investigators have demonstrated associations between environmental conditions, fear of falling and physical activity.[26-32] Older adults who perceive the external environment as less safe typically report more fear of falling and are less likely to be physically active compared to older adults living in perceived safe environments.[26-30] In addition, Huang (2005) recognized predictors of in-home hazards for falling, which included living in an urban area, fear of falling, being older (greater than 75 years of age), and having poor gait and balance.[31] Together, the studies reveal fear of falling, associated with external environmental factors and in- home hazards, presents a barrier to physical function and physical activity levels of older adults.

Senior living residences were designed in part to reduce barriers to walking, physical function and activity for older adults by enhancing the physical surrounding for ease of navigation. Additionally, SLRs' offer their residents access to services (i.e. cleaning and laundry service, landscape management, meal plans, and transportation accessibility) that

may reduce the need for residents to participate in at risk activities including, yard work, home maintenance, vigorous housecleaning, and stair negotiation. The enhanced environment may in turn create a sense of security, enabling residents of SLR to be more active in their environment. The sense of security may have influenced older adults in SLR to report a lower fear of falling compared to the ICR group (SAFFE fear subscale 0.24 vs. 0.50). The lower perceived fear of falling reported by older adults in SLR compared to the ICR group and secondarily, the lesser fear may have also impacted gait speed and physical activity levels. For example, older adults in SLR were older and had a greater number of comorbidities, both factors associated with poorer physical function, yet gait speed and physical activity were similar between groups by residence.

Alternatively, the similar mean gait speed and activity for adults in SLR compared to ICR may be directly related to the supportive environment of the SLR. For residents in SLR, easy access to indoor walking areas (hallways) and fitness center, walking to meal, social events, and mailbox, and volunteer opportunities within the residential community may promote physical activity. Seventy-two percent of older adults in SLR reported greater participation in “walking for exercise” (SAFFE activity) than did older adults living in ICR, 61%. Of the older adults who walked for exercise, only 15% of SLR adults compared to 40% of ICR adults were “worried that they may fall”. Walking for exercise for older adults in ICR may be more difficult, including the need to climb stairs and traverse uneven surfaces. Older adults in ICR who attempt the physical activity or functions similar to those in SLR may encounter environmental challenges, eliciting greater fear of falling, with a negative impact on physical activity and falls. Older adults living in ICR had a greater percentage of participation in “going out when it's slippery”, “visiting friends and relatives”, and “going out in crowds” compared to their SLR counterparts. However, 87% of ICR older adults who went out when slippery, 26% who visited friends and family, and 27% who went out in crowds were worried that they may fall while doing these activities. This was compared to older adults living in SLR, who reported 71%, 13%, and 0% worry, respectively. Enhanced physical surroundings and reduced need for participation in at risk activities may in turn account for the lower number of older adults reporting falls in the SLR (33%) compared to ICR (44%).

A unique strength of this cross-sectional study is that it is one of the few studies to explore the independent community dwelling population of older adults based on type of residence. Previous work has been done to explore differences between independent community dwelling older adults and assisted living and nursing home residents; but little has been done to study differences within the independent older adult population which may be important in planning services and providing guidance to enable older adults to live healthy and independently as possible. A second strength is the study of physical function of community dwelling older adults in SLR and ICR, independent of one another, yet in the same geography and climate environment.

Primary limitations of the study relate to whether the sample of older adults in SLR and ICR represent community-dwelling older adults in the population and the size of our sample. The senior living residence studied may not be representative of all senior living residences, relative to the environment and services provided as well as characteristics of the residents

such as socioeconomic status, race and gender. This study is a secondary analysis; defining differences between the older adults by residence may have been limited by inadequate power. Sub-analyses, stratifying within residence by fearful and not fearful, were unable to be explored given the small sample size. Additionally, we were unable to quantify the specific degree and or type of assistance either group received with their daily activities. Therefore, our findings are best interpreted within our defined groups of SLR and ICR. Prospective study designs may benefit from consideration of such issues to better understand similarities or differences between older adults by type of residence.

Conclusion

Older adults living in SLR compared to ICR had similar physical function (gait speed and physical activity) but differed in report of fear of falling and fall history. Recognizing the possible differences in physical and psychosocial function by place of residence may be important for researchers conducting studies or health care delivery services for community-dwelling older adults.

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Table 1

Demographics of Participants Based on Residence

Characteristics	SLR (n = 18)	ICR (n = 41)	P-value
Age, mean years (SD)	83.9 (4.1)	77.5 (5.3)	.001 *
Education, n (% completed ≥ 4 years of college)	10 (55.6)	26 (63.4)	.617
Gender, n (% female)	15 (83)	25 (61)	.091
Race, n (% white)	18 (100)	36 (87.8)	.121
Living Arrangement, n (% living alone)	15 (83)	16 (39)	.002 *
Number of Co-Morbidities (0- 18), mean (SD)	5.6 (1.8)	4.4 (1.95)	.025 *

SD = Standard Deviation

* Significance, p=.05

Table 2

Physical, Psychosocial and Fall History Measures Based on Residence

Dependent Variables	SLR (n=18) Mean (SD)	ICR (n=41) Mean (SD)	P-value
Physical Measures			
Gait Speed, m/sec.	0.92 (.21)	0.89 (.14)	.519
Actigraph Activity, CPM	115 (42.7)	133 (66.1)	.315
SAFFE Activity, (0-11)	8.1 (1.4)	8.5 (1.6)	.270
SAFFE Restriction, (0-11)	3.9 (2.1)	3.4 (2.7)	.536
Psychosocial Measures			
Fear of Falling			
SAFFE Fear of falling, (0 – 3)	0.24 (.34)	0.50 (.47)	.045*
Global Fear of falling, n (%)	9 (50)	21 (51.2)	.933
Gait Efficacy, (0-100)	72 (18.5)	74.1 (17.3)	.680
Fall History (Yes response), n (%)	6 (33.3)	18 (43.9)	.022*

SD = Standard Deviation, * p = .05

SD = Standard Deviation, * p < .05