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Mobility Device Use Among Older Adults and Incidence of Falls and Worry About Falling: Findings From the 2011–2012 National Health and Aging Trends Study

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Abstract

OBJECTIVES—To examine mobility device use prevalence among community-dwelling older adults in the U.S. and to investigate the incidence of falls and worry about falling by the type and number of mobility devices used.

DESIGN—Analysis of cross-sectional and longitudinal data from the 2011–2012 National Health and Aging Trends Study

SETTING—In-person interviews in the homes of study participants

PARTICIPANTS—Nationally representative sample of Medicare beneficiaries(N=7609).

MEASUREMENTS—Participants were asked about mobility device use (e.g., canes, walkers, wheelchairs and scooters) in the last month, one-year fall history and worry about falling.

RESULTS—Twenty-four percent of adults age ≥65 reported mobility device use in 2011 and 9.3% reported using multiple devices within the last month. Mobility device use increased with advancing age and was associated with non-White race/ethnicity, female sex, lower education level, greater multi-morbidity, and obesity (all P-values < 0.001). Adjusting for demographic, health characteristics, and physical function, the incidence of falls and recurrent falls were not

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Author Contributions: Nancy M. Gell conceived, designed, and performed the analyses and drafted the manuscript during a postdoctoral fellowship at Group Health Research Institute in Seattle, WA. Robert Wallace conceived of and interpreted the analyses, and revised the manuscript. Andrea Z. LaCroix interpreted the analyses and revised the manuscript. Tracy M. Mroz interpreted the analyses and revised the manuscript. Kushang V. Patel conceived, designed and interpreted the analyses and revised the manuscript.

associated with the use of multiple devices or any one particular type of mobility device. Activity-limiting worry about falling was significantly higher in cane-only users, compared with non-users.

CONCLUSION—The percentage of older adults reporting mobility device use is higher compared to results from previous national surveys and multiple device use is common among those who use any device. Mobility device use is not associated with increased incidence of falls compared to non-device users. Cane-only users may compensate for worry about falling by limiting activity.

Keywords

Mobility devices; falls; worry about falls

INTRODUCTION

Mobility devices, including canes, walkers, and wheelchairs are often prescribed for and used by older adults to compensate for decrements in balance, coordination, sensation, strength, and increased risk for falls. While sometimes prescribed by a physician and dispensed under guidance from a physical therapist, these devices are also available for purchase to the general public.[1, 2] Standard mobility devices include canes, standard and wheeled walkers, manually propelled wheelchairs, and motorized wheelchairs and scooters. There is evidence that mobility device use has been increasing over the past few decades. An age-adjusted comparison of results from the 1980 and 1990National Health Interview Survey (NHIS) found a 26% increase in the use of canes and a 57% and 65% increase in the use of walkers and wheelchairs, respectively, among all ages.[3] A comprehensive assessment using data from the 1994–1997 NHIS estimated that14% of United States (U.S.) adults age 65 and older used a mobility device and 40% of those age 85 and older used a cane, walker, or wheelchair for mobility. [4] An analysis of the representative sample of the 2004 Health and Retirement Study showed an increase since the estimate from the 1990s, with 16% of adults age 65 and older reporting mobility device use.[5]

A primary reason for mobility device prescription is to reduce the risk of falling while increasing mobility. It is estimated that 35–40% of community dwelling adults age 65 and older fall each year.[6] In this age group falls are associated with increased risk for functional impairment, morbidity, mortality and nursing home placement.[7] Falls are also the leading cause of death from injury in older adults. [8] Annual direct medical costs for fall-related injuries are estimated to exceed $19 billion in the U.S.[9]

The efficacy of mobility devices to prevent falls has been questioned. A recent systematic review of the evidence for use of walkers for older adults concluded there was not sufficient evidence to prove or disprove causation of falls with walker use.[10] This finding is not unexpected given that individuals who use mobility devices may already have a predisposition to greater fall risk and the number of falls potentially prevented by mobility device use is difficult to estimate. However, there is evidence of incorrect use of mobility devices by older adults,[11, 12] interference by canes and walkers with balance leading to potential increased risk of falls,[13] an impedance of lateral compensatory stepping

movements with cane and walker use,[14] and higher risk for severe injuries if a fall occurs while using a four-wheeled walker.[15]

Although there are several methodological challenges in studying free-living older adults to determine if mobility devices do indeed cause falls, population based studies afford an opportunity to examine differences in fall rates between those who use mobility devices and those who do not. Given the previous history of increasing use of mobility devices in the U.S.,[3–5] and the increased risk for functional decline in this population,[16, 17] there is a need to assess if and how mobility device use has changed among older adults in the past decade and implications for falls. The aims of the current study were to: 1) examine mobility device use prevalence in a nationally representative sample of community-dwelling older adults in the U.S. by demographic and health characteristics; and 2) describe the incidence of falls and worry about falling by the type and number of mobility devices used.

METHODS

Data from the 2011 (baseline) and 2012 (1-year follow-up) National Health and Aging Trends Study (NHATS) were analyzed (http://www.nhats.org). The NHATS is designed to examine late life trends in disability and to advance understanding of functional changes in U.S adults age 65 and older. [18] The NHATS is sponsored by the U.S. National Institute on Aging (grant number NIA U01AG032947) and is conducted by the Johns Hopkins University. Data collection consisted of in-home standardized interviews. Written informed consent was obtained from all participants or their proxy respondents.

Study Population

A nationally representative sample of community-dwelling adults age 65 and older (n=8245) was enrolled in the NHATS using the Medicare enrollment database as the sampling frame (71% survey response rate). This study used a multistage sampling design with oversampling of Black non-Hispanic persons and the oldest-old (≥85 years). Participants with proxy-respondents, in circumstances of dementia, cognitive impairment, speech impairment or severe illness, were retained in the analysis. Participants living in nursing homes who were not expected to return to their previous residence (n=468, 5.7%) and those who did not complete the in-person interview (n=168, 2%) were excluded from the analysis, resulting in a final sample of 7609 community-dwelling older adults at baseline. Follow-up interviews were conducted one year later with the same cohort. The weighted response rate for living sample persons at the second round of interviews was 84.9% (n=6113).

Measures

Demographic variables from the baseline interview included age, sex, self-identified race and ethnicity and education. Participants were asked if a doctor has ever told them that they have certain medical conditions including: osteoarthritis, osteoporosis, hip fracture, diabetes, stroke, and dementia. Within the publically available data files, age was categorized into 5-year increments (beginning at age 65 up to ≥90) and race/ethnicity was categorized into four groups(White-non-Hispanic, Black-non-Hispanic, Hispanic, and Other). Body mass index (BMI) was calculated from measured height and weight with obesity defined as BMI ≥ 30.0

kg/m^2. Cognition was assessed using orientation to the day, date, month and year. [18] Depressive symptoms were identified with the Patient Health Questionnaire-2 (PHQ-2).[19] This validated and widely used 2-item screen for depression has a score range of 0–6 with a score of 3 indicating need for further depression screening. Participants were asked if they had been bothered by pain in the last month (Yes/No).[20] Participants were asked "In the last month did you have problems with balance or coordination" and if they answered in the affirmative were then asked "In the last month did your balance or coordination problems ever limit your activities?" An index of balance or coordination impairment was constructed from two questions (0=none, 1=balance/coordination problems, 2=balance/coordination problems that limit activity).[21] Vision impairment was assessed by asking participants if they were legally blind, had trouble reading newspaper print with glasses, contacts, or vision aids, were able to recognize a person across the street when using glasses or contacts, and able to see a television across the room with use of glasses or contacts.

An index of physical capacity was computed from six pairs of tasks assessing a range of functional abilities (ability to walk 3/6 blocks; ability to walk up 10/20 stairs; ability to lift and carry 10/20 pounds; ability to bend over/kneel down without upper body support; ability to reaching overhead/place a heavy object overhead; and ability to grasp small objects/open a sealed jar with hands only).[22] If a participant reported ability to perform the more challenging task of each pair they were not asked about the easier version of the task and were assumed to be able to do it. A composite score was calculated by summing the total number of activities the respondent reported they were able to do (range 0 to 12) with higher values indicating greater physical capacity. Freedman, et al.[22] demonstrated that individual physical capacity items have reasonable test-retest reliability and the composite score has been used in previous studies of disability,[23] pain[20] and stroke.[24]

Participants were asked to report any mobility device use in the month prior to the baseline interview, including use of a cane, walker, wheelchair (manual, power, electric, or motorized), and/or scooter. Participants were also asked how long they used any one mobility device to the month or year level. Categories of device use were created based on number of devices used in the last month (0, 1, ≥2) and by length of time of use (0, ≤1 year, > 1 year). In the NHATS questionnaire, falling down was described to participants as "any fall, slip, or trip in which you lose your balance and land on the floor or ground or at a lower level." Fall history was assessed at baseline (2011) and 1-year follow-up (2012) with a series of questions about falls and worry about falls, including "In the last 12 months, have you fallen down?" (Yes/No); "In the last 12 months, have you fallen down more than one time?" (Yes/No); "In the last month, did you worry about falling down?" (Yes/No); and "In the last month, did this worry ever limit your activities?" (Yes/No).

Data Analysis

All analyses were performed with Stata (Version 12.1 Stata Corp., College Station, TX). Analytic weights assigned to all participants were used to account for non-response, oversampling, and incomplete interviews. Taylor series linearization, incorporating the survey sample design, was used to calculate variance estimates (95% confidence intervals [CI]). Prevalence of mobility device use was estimated for the population as a whole and by

age, race/ethnicity, education level, weight status, common medical conditions, and total number of medical conditions. Differences in mobility device use by demographic characteristics and medical conditions were evaluated using the adjusted Wald statistic. Any fall reported at the 1-year interview was considered an incident fall, regardless of prior history of falls. Incidence of falls and worry about falling were estimated according to number of mobility devices used and history of a fall in the previous year. Incidence rates were calculated and Poisson regression was used to estimate incidence rate ratios and 95% CI for falls and worry about falls by mobility device use (type, number and length of time used), adjusting for demographics, medical conditions, physical capacity, cognition, fall history, balance or coordination impairment, and activity-limiting vision impairment. Associations of mobility device use with incident falls were also evaluated stratifying the population by fall history.

RESULTS

In 2011, 24% (95% CI: 23.0–25.2%), or 8.5 million, of adults age 65 and older in the U.S. reported using any mobility device in the last month (See Table 1). A third of mobility device users (9.3% of the total population, 95% CI: 8.6–10.1%) reported using more than one device in the last month. The most commonly used mobility device was a cane (16.4% of the total population) and the least used device was a scooter (2.3%).

As illustrated in Figure 1, across all age groups, a higher percentage of women used any type of mobility device compared to men; with a 19–29% difference depending on the age group. Notably, 75.6% of women age 90 and above reported some type of mobility device use in the last month (95% CI: 69.9–80.5). A higher percentage of women than men used canes, walkers, and wheelchairs across all age categories; however, a higher percentage of men than women age 75 and older used electric scooters. At all ages, a higher percentage of women reported multiple device use (i.e., used two or more kinds of mobility devices in the last month) compared to men (range of difference: 2.0%-11.7%).

Mobility device use was also significantly associated with Non-Hispanic Black race, Hispanic ethnicity, obesity, lower education level, pain, higher levels of multi-morbidity, and balance/coordination impairment (See Table 2). Among those who reported using any mobility device, 75.7 % (95% CI: 73.6–77.8) had used one for over a year. The mean length of time of mobility device use was 4.0 years (range: 1 month-64 years; interquartile range: 1 month to 3 years). Among non-device users at baseline 7.9% (95% CI: 7.1–8.8%) reported using a mobility device one year later. Sixteen percent (95% CI: 13.3–18.1%) of mobility device users at baseline were no longer using a device one year later.

As shown in Figure 2, incident falls and multiple falls were highest among those with a history of device use and a history of falls. Among older adults who did not use a mobility device at baseline and did not have a history of falls, 21.1% (95% CI: 19.4–22.9) reported an incident fall the following year, while 49.6% (CI: 45.9–53.3) of older adults who did not use a mobility device at baseline but had a history of falling reported falling again the following year. Among those with a history of falling, those who used a mobility device at baseline had a higher incidence of falling and worry about falling compared to those who did not use

a mobility device. Among mobility device users, a greater percentage worried about falling compared to non-device users regardless of fall history. Half of the older adults who used a mobility device at baseline reported worry about falling at follow-up (50.7%, 95% CI: 47.9–53.5); whereas, less than a quarter (21.8%, 95% CI: 20.3–23.3) of those who did not have a history of device use worried about falling the following year.

The associations of the number of devices used, duration of device use, and type of device used with incidence of falls, recurrent falls and worry about falling in the subsequent year are shown in Table 3. In comparison to non-device users, there was no difference in incidence of falls or recurrent falls in older adults who used any number of mobility devices when adjusting for demographics, medical conditions, physical capacity, cognitive function, and fall history. There was also no significant difference in incidence of falls by length of time of device use (none, ≤1 year, or > 1 year) at baseline or by type of device used compared to those who did not use any device. Participants who used a cane or walker only did not worry about falls more than non-device users. However, worry about falls was 33% lower in those who reported using a wheelchair or scooter only (95% CI: 0.49–0.93). Activity-limiting worry about falls was 30% higher among cane-only users compared to non-device users (95% CI: 1.03–1.64). Users of more than one mobility device in the past month did not have a higher incidence of worry about falling compared to non-devices users.

In a sensitivity analysis, we stratified the analysis by history of a fall in the previous year. After adjusting for demographics, medical conditions, physical capacity, and cognitive function, there was no difference in the incidence of falls or multiple falls by number of mobility devices used in the last month (0, 1, ≥2), length of mobility device use, or specific type of device used among those with a previous history of falling or among those without a history of falling.

DISCUSSION

In this nationally representative sample, 24% of the U.S. population age 65 and older reported using a mobility device in the last month with a third of all mobility device users reporting multiple device use. Consistent with previous studies, mobility device use increased by age and was more commonly reported by women, ethnic and racial minorities, and those with lower education, lower (underweight) and higher (obese) BMI, greater disease burden and impaired balance or coordination.[3–5] Compared to the 16% estimated by Cornman and Freedman based on data from the HRS, there has been nearly a 50% increase in the use of mobility devices since 2004.[5] Of interest is whether this is attributable to greater disability, increased longevity, a correction for unmet needs in previous decades, or greater acceptance and use of mobility devices among older adults. Understanding the determinants of higher use will provide insight on training needs of older adults (i.e., are current mobility device training standards sufficient for safety and mobility) as well as insight on whether use tracks appropriately with current needs.

Prevalence of using more than one device within a recent time frame (i.e., multiple device use) has not, to our knowledge, been described previously. Multiple device use may be

related to a number of potential factors such as: 1) environmental and terrain differences (e.g., cane for inside the home and walker for outside the home, or a wheelchair for navigating long distances outside the home and a walker for covering short distances inside the home, or different devices for different levels within the home); 2) a change in physical capacity requiring more or less external support (e.g., status post hip fracture recovery with transition from walker to cane); and/or 3) a health condition with symptom variability (e.g., chronic pain, osteoarthritis) leading to subsequent variation in the amount of support needed for mobility. This has implications for practitioners, especially those who prescribe and train older adults in the use of mobility devices. In particular, a need for training and safety assessment on more than one device, when applicable, as well as continued follow-up to identify physical changes requiring additional devices or discontinuation of devices no longer needed for safety are indicated. Further exploration is needed to better understand if multiple device use indicates better matching of device to circumstance or if it reflects incongruity between what is prescribed for patients and what they choose to use. Data from future NHATS interviews will help to identify trajectories of device use with aging and functional changes as well as longitudinal characterization of multiple device use.

The incidence of reported falls and recurrent falls were not different between device and non-device users. Additionally, the use of multiple devices or any one particular mobility device did not result in a higher incidence of falls or multiple falls compared to non-device users. Previous studies have shown evidence for increased risk of falling with mobility device use and walker use in particular;[11–15] notably, these studies primarily looked within populations already using these devices without a comparison group of non-device users. The current study is reassuring in this regard. With adjustment for demographic factors, medical conditions, physical capacity, and fall history, the older adults who used mobility devices had similar incidence of reported falls as those who did not use mobility devices. Although mobility device use did not appear to lower the incidence of falling, this is not wholly unexpected given that mobility device use is significantly associated with many of the risk factors for falls. It is unknown how often comprehensive fall risk reduction efforts coincide with mobility device prescription. An examination of the co-occurrence of fall risk assessments and device prescription may help better identify if this results in reduced fall risk without a reduction in mobility or activity levels.

In the current study, those who used only a cane had a higher incidence of worry severe enough to limit activity. Of potential interest is whether personal restraint on activity is a primary reason for comparable adjusted fall rates with cane-only users. Fall prevention is critical for this population but limiting activity is not the optimal means to achieve this goal, given the additional risks associated with inactivity. [25] While canes are prescribed appropriately in many circumstances, the significantly higher percentage of cane users reporting mobility restriction due to fear of falling suggests a potential mismatch between the device and the user. Compared to other mobility devices, canes may be better received due to their low profile, ease of learning to use, lower cost, and ease of transport compared to walkers and wheelchairs. It is unknown how often these factors influence the use of a cane compared to other devices. Repeated assessments post mobility device prescription would help identify changes in mobility (e.g. improved with external support or reduced due to fear of falling) and need for alternative device prescription or other interventions such as

rehabilitation or referral to community fall prevention classes. It has been suggested previously that clinical guidelines for mobility devices could serve to improve device prescription.[10] Ideally, guidelines would provide relevant information on how best to identify the most appropriate mobility device based on an individual's impairment, physical activity levels, falls risks, and home environment.

A key risk factor for falling and for serious falls-related injury among older adults is history of a previous fall.[26] As might be expected, in this representative sample of older adults those with no device use and no history of falls had the lowest incidence of subsequent falls and worry about falls, and those with a history of device use and past falls had the highest incidence of falls and worry about falls in the following year. It is notable that 49.6% of those with a history of falling but no mobility device use reported a subsequent fall the following year. Over 25% of the same sub-population had multiple falls in the second year, indicating high risk for future falls and falls-related injury. While this most likely represents a heterogeneous population in terms of function and mobility, by comparison this same population had a higher incidence of subsequent falls compared to those who used a mobility device but had no fall history. It does suggest a sub-population that may benefit from more directed intervention efforts and further evaluation and treatment of risk factors for falls. For example, given a history of falling, would a mobility device prescription be appropriate or would other tailored fall reduction efforts be of additional benefit in this population. Twelve percent of this population reported limiting their activity due to worry about falling but did not use a mobility device. Further evaluation may be warranted if a mobility device or other interventions would help reduce fear of falling and help maintain activity levels in this subset of the population.

We acknowledge several limitations of the study. The design of the study makes it difficult to assemble comparable populations to assess the impact of mobility device use vs. non-use on fall rates; however, our analyses adjusted for many characteristics that might confound the mobility device-falls association. Unlike previous national surveys, the NHATS questions allowed for categorization of multiple mobility device use to better assess the prevalence and characterization of multiple device users. However, the level of detail in the questions did not allow for identification of the primary device used, or reasons and circumstances for multiple device use. While the NHATS captured incident falls, the structure of the questions and data collection did not query whether a person was using an assistive device at the time of the fall(s), the cause of the fall, injuries that resulted from the fall, or severity of injuries from falling. More detailed information on causes and outcomes of the falls reported could help to clarify the associations between mobility devices and falls. Additionally, the reliance on a year-long recall may have resulted in under-reporting of falls. A clear study strength is that the sample is representative of older, community-dwelling Medicare beneficiaries in the US.

The percentage of older adults using mobility devices has increased over the last three decades and multiple device use is common among those who use any device. Given the challenges of conducting studies that directly assess fall risk from mobility devices, a focus on determinants and outcomes of multiple device use, circumstances that lead to multiple

device use, and determinants of non-device use among those with a previous history of multiple falls may assist with fall prevention efforts.

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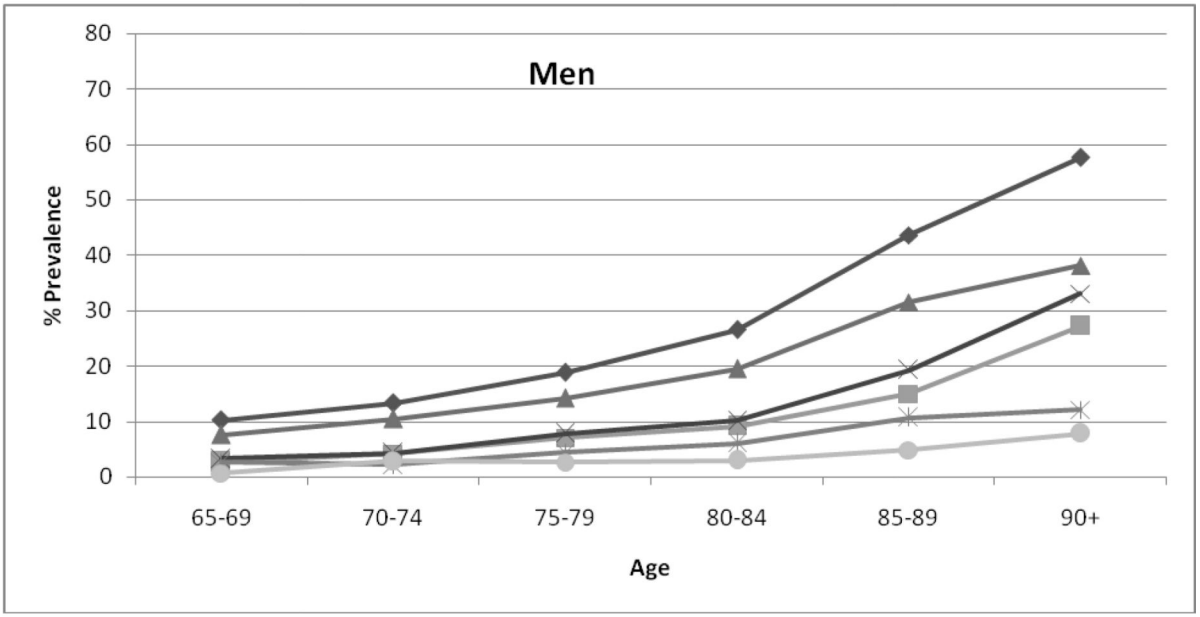
A.



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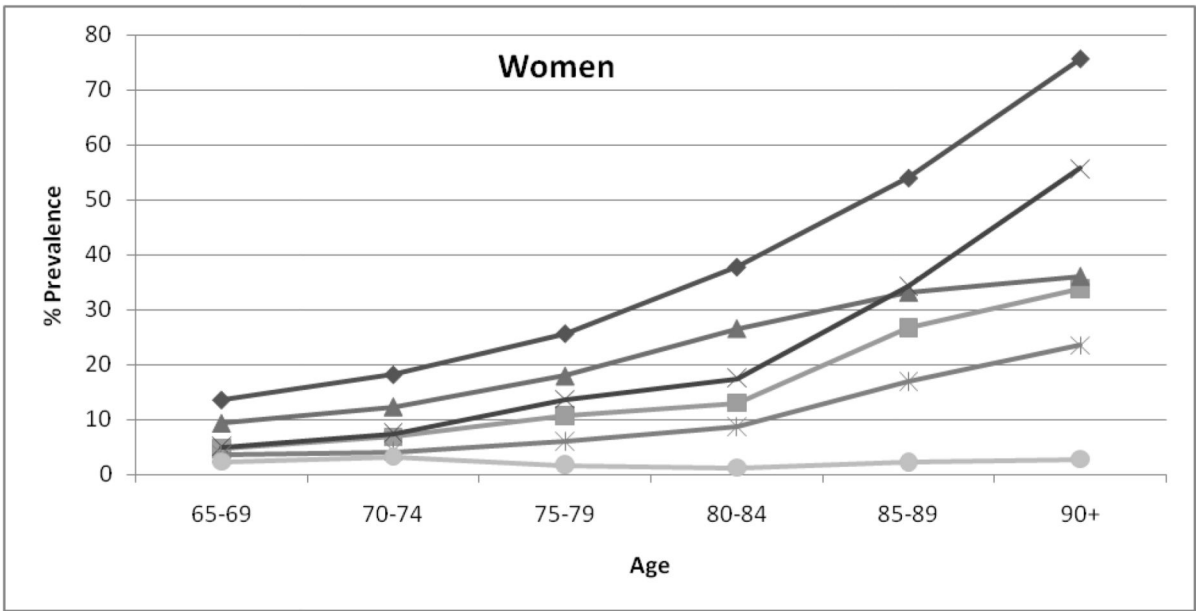

Figure 1.

Prevalence of Mobility Device Use by Age in Men (A) and Women (B) 65 Years and Older, United States: National Health and Aging Trends Study, 2011.

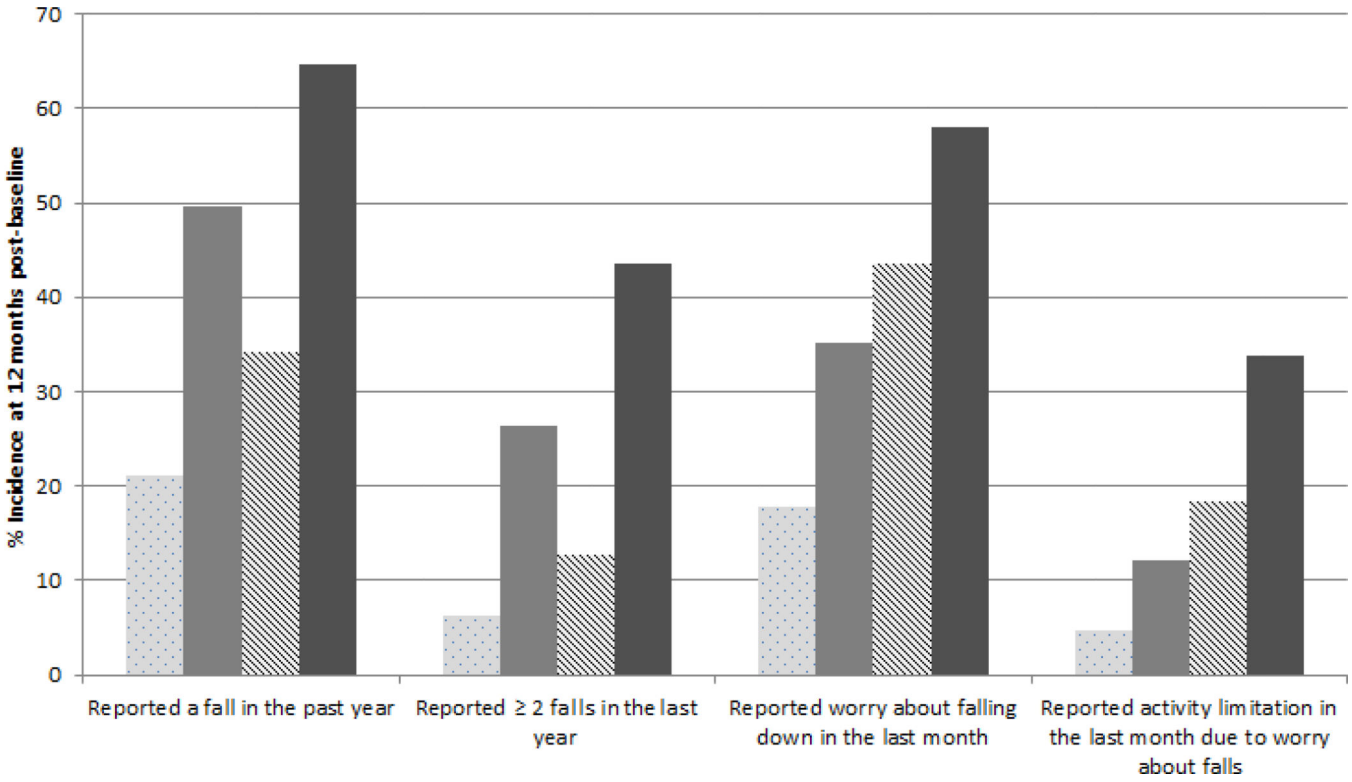

Figure 2.

Incidence of Falls and Worry About Falls 12 Months Post Baseline According to the Number of Mobility Devices Used and Fall History at Baseline, United States: National Health and Aging Trends Study, 2011 −2012

Table 1

Prevalence of Mobility Device Use in Adults 65 Years and Older, United States: National Health and Aging Trends Study, 2011

	Number in the US	% Prevalence (95% CI)
Device		
Cane	5,788,000	16.4 (15.5–17.3)
Walker	4,094,000	11.6 (10.8–12.5)
Wheelchair	2,135,000	6.1 (5.5–6.7)
Scooter	815,000	2.3 (1.9–2.8)
No. of Devices		
0	26,832,000	75.9 (74.8- 77.0)
1	5,190,000	14.7 (13.8- 15.6)
≥2	3,297,000	9.3 (8.6–10.1)
Total		
Any device use (≥1)	8,506,000	24.1(23–25.2)

CI: Confidence Interval

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Table 2

Prevalence of Mobility Device Use According to Demographic and Health Characteristics in Adults 65 Years And Older, United States: National Health and Aging Trends Study, 2011

	Any % Prevalence (95% CI)	Cane % Prevalence (95% CI)	Walker % Prevalence (95% CI)	Wheelchair % Prevalence (95% CI)	Scooter % Prevalence (95% CI)	≥2 Mobility Assistive Devices % Prevalence (95% CI)
Age						
65–69	11.9 (10.3–13.8)	8.6 (7.1–10.3)	4.2 (3.3–5.3)	3.2 (2.5–4.2)	1.5 (1.0–2.3)	3.8 (2.9–5.1)
70–74	15.9 (14–18)	11.6 (9.9–13.4)	6.0 (5.1–7.2)	3.3 (2.5–4.4)	2.99 (2.1–4.2)	5.7 (4.7–6.8)
75–79	22.6 (20.7–24.6)	16.3 (14.6–18.2)	11 (9.2–13.2)	5.3 (4.2–6.7)	2.09 (1.5–2.9)	9.2 (7.7–11)
80–84	33.1 (30.7–35.7)	23.7 (21.5–26.1)	14.5 (12.7–16.4)	7.6 (6.1–9.5)	1.95 (1.3–3.0)	11.5 (10.1–13.1)
85–89	50.1 (46.6–53.7)	32.5 (29.9–35.3)	28.7 (25.5–32.2)	14.6 (12–17.7)	3.16 (2.1–4.8)	22.4 (19.7–25.4)
≥90	70.6** (65.5–75.2)	36.6** (32.3–41.2)	49.5** (45–53.9)	20.3** (16.9–24.2)	4.16* (2.6–6.6)	32.1** (27.6–36.8)
Sex						
Men	18.8 (17.4–20.3)	14.0 (12.7–15.3)	7.4 (6.7–8.2)	4.2 (3.5–5.1)	2.5 (2.0–3.1)	6.5 (5.8–7.2)
Women	28.1** (26.5–29.8)	18.3** (17.1–19.5)	14.9** (13.6–16.2)	7.4** (6.7–8.3)	2.2 (1.7–2.9)	11.5** (10.5–12.6)
Race/ Ethnicity						
White Non-Hispanic	22.9 (21.7–24.2)	15.1 (14.1–16.1)	11.3 (10.4–12.3)	5.8 (5.1–6.6)	2.3 (1.8–2.8)	8.9 (8.0–9.8)
Black Non-Hispanic	33.7 (31.5–35.9)	26.5 (24.2–28.9)	13.6 (11.9–15.6)	8.2 (7.0–9.7)	2.5 (1.9–3.3)	13.1 (11.4–15.1)
Hispanic	28 (24.2–32.2)	20 (16.8–23.5)	14.2 (11.7–17.2)	6.8 (5.4–8.4)	2.9 (1.8–4.6)	11.6 (9.7–13.9)
Other	20.5** (16.7–24.9)	16.3** (12.6–20.7)	9.43* (6.8–13)	5.7* (3.8–8.4)	1.5 (0.5–4.2)	7.9** (5.5–11.2)
Education						

	Any % Prevalence (95% CI)	Cane % Prevalence (95% CI)	Walker % Prevalence (95% CI)	Wheelchair % Prevalence (95% CI)	Scooter % Prevalence (95% CI)	≥2 Mobility Assistive Devices % Prevalence (95% CI)
<9years	37.4 (34.2–40.6)	28.0 (24.7–31.5)	18.0 (16.1–20.2)	9.8 (8.2–11.7)	3.0 (2.0–4.5)	15.7 (13.3–18.4)
9–11years	29.9 (27–32.9)	19.7 (17.1–22.5)	15.7 (13.3–18.4)	7. (5.9–9.0)	2.9 (1.7–4.7)	12.1 (10.0–14.6)
High school	24.1 (22–26.3)	14.9 (13.4–16.6)	12.2 (10.5–14.1)	6.1 (5.1–7.2)	2.2 (1.6–2.9)	8.9 (7.7–10.4)
Some college/voc.	23.3 (21.2–25.6)	16.3 (14.5–18.3)	11.3 (9.5–13.3)	5.8 (4.7–7.1)	2.8 (1.9–4.1)	9.5 (7.9–11.3)
College grad.	17.4 (14.9–20.3)	12.4 (10.4–14.8)	7.9 (6.3–10.0)	5.0 (3.8–6.6)	1.8 (1.0–3.2)	7.2 (5.8–8.9)
Advanced degree	14.6** (12.6–16.8)	10.7** (8.7–13.1)	4.9** (3.6–6.7)	2.7** (1.7–4.2)	1.1 (0.5–2.3)	3.6** (2.5–5.1)
Weight status						
Underweight (BMI<18.5)	35.1 (28.0–43.0)	17.8 (12.9–24.2)	18.4 (13.1–25.3)	13.9 (9.1–20.7)	2.2 (0.8–6.0)	14.9 (10.1–21.3)
Normal (BMI 18.5–24.9)	22.1 (20.3–24)	13.5 (12.3–14.9)	11.9 (10.5–13.6)	5.8 (4.8–7.0)	1.5 (1.0–2.0)	8.6 (7.4–10.0)
Overweight (BMI 25.0–29.9)	19.7 (18.0–21.5)	14.1 (12.7–-15.6)	9.3 (8.3–10.5)	4.9 (4.1–5.8)	1.7 (1.2–2.3)	7.8 (6.8–8.9)
Obese (BMI≥30)	30.5** (28.5–32.5)	21.9** (20.2–23.8)	13.6** (12.0–15.3)	7.1** (6.1–8.2)	4.0** (3.2–5.0)	11.6** (10.4–12.9)
Medical conditions and impairments						
Arthritis	32.9** (31.5–34.2)	23.3** (22.0–24.6)	16.2** (15.1–17.3)	8.1** (7.3–9.0)	3.3** (2.7–4.1)	13.4** (12.5–14.5)
Osteoporosis	36.3** (33.7–38.9)	24.6** (22.7–26.6)	18.7** (16.6–21.0)	10.3** (8.7–12.2)	3.6* (2.6–5.0)	16.0** (14.1–18.1)
Hip fracture	61.1** (54.4–67.4)	33.4** (28.2–39)	42.3** (37.3–47.5)	22.7** (17.7–28.7)	6.4** (3.6–11.3)	32.9** (27.9–38.4)
Stroke	47.9** (44.3–51.6)	28.1** (24.8–31.6)	26.1** (23.1–29.4)	15.7** (13.2–18.6)	5.8** (4.1–8.0)	21.1** (18.3–24.2)
Heart disease	37.9** (35.0–40.8)	25.2** (22.8–27.8)	19.9** (17.8–22.1)	10.9** (9.2–12.9)	5.3** (4.1–6.9)	17.3** (15.5–19.2)

	Any % Prevalence (95% CI)	Cane % Prevalence (95% CI)	Walker % Prevalence (95% CI)	Wheelchair % Prevalence (95% CI)	Scooter % Prevalence (95% CI)	≥2 Mobility Assistive Devices % Prevalence (95% CI)
Diabetes	35.0** (32.7–37.4)	24.8** (22.5–27.2)	17.3** (15.4–19.3)	8.6** (7.6–9.8)	4.2** (3.3–5.3)	14.3** (12.6–16)
Dementia	58.5** (53.0–63.8)	24.4** (20.5–28.7)	38.1** (32.9–38.1)	27.2** (22.6–32.4)	3.6 (2.1–6.1)	28.8** (24.2–33.9)
Vision Impairment	54.8** (50.7–54.8)	31.1** (27.2–35.2)	31.1** (27.2–35.7)	22.0** (18.0–26.7)	3.4 (2.1–5.6)	25.7** (21.2–30.7)
Pain	33.4** (31.7–35.2)	23.4** (22–24.9)	16.4** (15.1–17.8)	8.4** (7.4–9.5)	3.6** (2.9–4.4)	13.7** (12.5–15.0)
Number of Medical Conditions						
0	5.7 (4.4–7.3)	3.9 (2.9–5.3)	2.7 (1.8–4.2)	1.11 (0.6–1.9)	0.8 (0.4–1.9)	1.8 (1.2–2.8)
1	10.3 (8.6–12.3)	6.7 (5.2–8.5)	4.75 (3.8–6.0)	2.27 (1.6–3.3)	669 (0.3–1.3)	3.1 (2.4–4.1)
2	19.2 (17.5–21.0)	13.9 (12.5–15.5)	8.24 (6.9–9.8)	4.02 (3.1–5.3)	1.03 (0.6–1.7)	6.5 (5.2–8.2)
3	26.9 (24.7–29.3)	18.4 (16.7–20.3)	13 (11.5–14.7)	6.15 (5.0–7.6)	2.65 (1.9–3.7)	10.0 (8.5–11.8)
≥4	44.4** (41.9–47.0)	29.6** (27.2–32.1)	22.7** (20.9–24.6)	12.9** (11.6–14.4)	5.2** (4.1–6.6)	19.4** (17.8–21.1)
Balance/ Coordination						
No impairment	12.7 (11.8–13.6)	9.2 (8.5–10.0)	5.0 (4.4–5.7)	2.3 (1.9–2.8)	0.9 (0.7–1.2)	3.7 (3.3–4.2)
Impairment	37.0 (32.9–41.2)	25.7 (22.6–29.1)	17.2 (14.1–21.0)	8.1 (6.4–10.2)	2.5 (1.5–4.1)	13.8 (11.4–16.7)
Impairment limits activities	63.9** (60.9–66.9)	40.9** (37.6–44.4)	36.3** (33.6–39.2)	20.5** (17.9–23.3)	8.3** (6.7–10.4)	30.5** (27.8–33.3)

* P<0.05

** P<.001

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Table 3

Association of Mobility Device Use with Incident Falls and Worry About Falls in Adults 65 Years and Older, United States: National Health and Aging Trends Study, 2011 −2012.

	No (Weighted %) 2011 N=6047	A fall in the past year 2012 IRR (95% CI) N=5939	≥ 2 falls in the past year 2012 IRR (95%CI) N=5934	Worries about falling down 2012 IRR (95% CI) N=5944	Worry about falling limits activity 2012 IRR (95% CI) N=5943
Number of Mobility Devices					
0	4294 (77.3)	1.00	1.00	1.00	1.00
1	1063 (14.1)	1.09 (0.95–1.26)	1.01 (0.83–1.23)	1.05 (0.93–1.19)	1.25 (1.01–1.54)
≥2	690 (8.6)	1.06 (0.90–1.24)	0.88 (0.69–1.12)	0.93 (0.82–1.05)	0.99 (0.77–1.27)
Duration of Device Use					
0	4294 (77.3)	1.00	1.00	1.00	1.00
< 1 year	297 (4.4)	1.13 (0.94–1.35)	0.88 (0.67–1.16)	1.01 (0.85–1.19)	1.23 (0.96–1.57)
> 1 year	1457 (18.3)	1.06 (0.93–1.21)	1.01 (0.67–1.16)	1.02 (0.91–1.14)	1.13 (0.90–1.41)
Device Type					
No device	4294 (77.3)	1.00	1.00	1.00	1.00
Cane only	727 (9.4)	1.12 (0.97–1.29)	1.06 (0.86–1.30)	1.13 (1.00–1.29)	1.30 (1.03–1.64)
Walker only	243 (3.3)	1.01 (0.84–1.23)	0.93 (0.68–1.26)	0.98 (0.80–1.19)	1.23 (0.90–1.67)
Wheelchair/Scooter Only	93 (1.4)	1.00 (0.73–1.36)	0.82 (0.51–1.33)	0.67 (0.49–0.93)	0.96 (0.56–1.66)

IRR=Incidence Rate Ratio; CI=Confidence Interval

All 4 models adjusted for age, sex, race/ethnicity, education, obesity, depressive symptoms, pain, dementia, arthritis, osteoporosis, hip fracture, stroke, orientation, fall history, balance/coordination impairment, activity limiting vision impairment, and physical capacity index (0–12)