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

Nancy M. Gell, PhD, MPH, Robert B. Wallace, MD, MSc,† Andrea Z. LaCroix, PhD,‡ Tracy M. Mroz, PhD,§ and Kushang V. Patel, PhD, MPH¶*

OBJECTIVES: To examine the prevalence of mobility device use in community-dwelling older adults in the United States and to investigate the incidence of falls and worry about falling according to type and number of mobility devices used.

DESIGN: Analysis of cross-sectional and longitudinal data from the 2011–12 National Health and Aging Trends Study.

SETTING: In-person interviews in the homes of study participants.

PARTICIPANTS: Nationally representative sample of Medicare beneficiaries (n = 7,609).

MEASUREMENTS: Participants were asked about mobility device use (e.g., canes, walkers, wheelchairs and scooters) in the last month, 1-year fall history and worry about falling.

RESULTS: Twenty-four percent of adults aged 65 and older 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 nonwhite race and ethnicity, female sex, lower education level, greater multimorbidity, and obesity (all $P < .001$). Adjusting for demographic and health characteristics and physical function, the incidence of falls and recurrent falls was not associated with the use of multiple devices or any particular type of mobility device. Activity-limiting worry about falling was significantly higher in cane-only users than in nonusers.

CONCLUSION: The percentage of older adults reporting mobility device use is higher than results from previous national surveys, and multiple device use is common in those who use any device. Mobility device use is not associated with greater incidence of falls. Cane-only users may compensate for worry about falling by limiting activity. **J Am Geriatr Soc 2015.**

Key words: mobility devices; falls; worry about falls

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 risk of falls. Although a physician sometimes prescribes these devices, and they are dispensed under guidance from a physical therapist, they 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 1990 National Health Interview Survey (NHIS) found a 26% increase in the use of canes, a 57% increase in the use of walkers, and a 65% increase in the use of wheelchairs at all ages.[3] A comprehensive assessment using data from the 1994–97 NHIS estimated that 14% of U.S. adults aged 65 and older used a mobility device and that 40% of those aged 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 aged 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% to 40% of community-dwelling adults aged 65 and older fall each year.[6] Falls are associated in this age group with risk of functional impairment, morbidity, mortality, and nursing home placement.[7] Falls are also the leading cause of death from injury in older adults.[8]

From the *Department of Rehabilitation and Movement Science, University of Vermont, Burlington, Vermont; †College of Public Health Department of Epidemiology, University of Iowa, Iowa City, Iowa; ‡Department of Family and Preventive Medicine, University of California at San Diego, La Jolla, California; §Department of Rehabilitation Medicine, University of Washington; and ¶Department of Anesthesiology and Pain Medicine, University of Washington, Seattle, Washington.

Address correspondence to Nancy M. Gell, 310E Rowell 106 Carrigan Dr., Burlington, VT 05405. E-mail: ngell@uvm.edu

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Annual direct medical costs for fall-related injuries are estimated to exceed $19 billion in the United States.[9]

The efficacy of mobility devices in preventing 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 greater fall risk and the number of falls that mobility device use may prevent is difficult to estimate but, there is evidence of incorrect use of mobility devices by older adults,[11,12] interference by canes and walkers with balance leading to risk of falls,[13] impedance of lateral compensatory stepping movements with cane and walker use,[14] and higher risk of severe injuries if a fall occurs while using a four-wheeled walker.[15]

Although there are several methodological challenges in studying community-living older adults to determine whether mobility devices cause falls, population-based studies afford an opportunity to examine differences in fall rates between those who do and do not use mobility devices. Given the history of increasing use of mobility devices in the United States[3–5] and the greater risk of functional decline in this population,[16,17] there is a need to assess whether and how mobility device use has changed in older adults in the past decade and implications for falls. The aims of the current study were to examine the prevalence of mobility device use in a nationally representative sample of community-dwelling older adults in the United States according to demographic and health characteristics and to describe the incidence of falls and worry about falling according to 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 aged 65 and older.[18] It is sponsored by the National Institute on Aging (Grant NIA U01AG032947) and 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 aged 65 and older (n = 8,245) 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 people and individuals aged 85 and older. 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 7,609 community-dwelling older adults at baseline. Follow-up interviews were conducted 1 year later with the same cohort. The weighted response rate for living sample persons at the second round of interviews was 84.9% (n = 6,113).

Measures

Demographic variables from the baseline interview included age, sex, self-identified race and ethnicity, and education. Participants were asked whether a doctor had ever told them that they had certain medical conditions: osteoarthritis, osteoporosis, hip fracture, diabetes mellitus, stroke, and dementia. Within the publically available data files, age was categorized into 5-year increments (from 65 to ≥90), and race and 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 and obesity defined as a BMI 30.0 kg/m^2 or greater. Cognition was assessed using orientation to day, date, month, and year.[18] Depressive symptoms were identified using the Patient Health Questionnaire-2 (PHQ-2),[19] a validated and widely used two-item screen for depression with a score range from 0 to 6 and a score of 3 indicating need for further depression screening. Participants were asked whether they had been bothered by pain in the last month (yes, no).[20] An index of balance or coordination impairment was constructed from the answers to two questions. First they were asked, "In the last month, did you have problems with balance or coordination?" If they answered in the affirmative, they were asked, "In the last month did your balance or coordination problems ever limit your activities?" (0 = none, 1 = balance/coordination problems, 2 = balance/coordination problems that limit activity).[21] Vision impairment was assessed by asking participants whether they were legally blind, had trouble reading newspaper print with glasses, contact lenses, or vision aids; were able to recognize a person across the street when wearing glasses or contact lenses; and were able to see a television across the room with use of glasses or contact lenses.

An index of physical capacity was computed from six pairs of tasks assessing a range of functional abilities (walk 3 or 6 blocks; walk up 10 or 20 stairs; lift and carry 10 or 20 pounds; bend over or kneel down without upper body support; reach overhead or place a heavy object overhead; grasp small objects or 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 0–12), with higher values indicating greater physical capacity. Individual physical capacity items have reasonable test–retest reliability,[22] 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 before the baseline interview, including use of a cane, walker, wheelchair (manual, power, electric, motorized), 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 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 using Stata version 12.1 (Stata Corp., College Station, TX). Analytical weights assigned to all participants were used to account for nonresponse, oversampling, and incomplete interviews. Taylor series linearization, incorporating the survey sample design, was used to calculate variance estimates. Prevalence of mobility device use was estimated for the population as a whole and according to age, race and ethnicity, education level, weight status, common medical conditions, and total number of medical conditions. Differences in mobility device use according to 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% confidence intervals (CIs) for falls and worry about falls according to mobility device use (type, number, length of time used), adjusting for demographic characteristics, medical conditions, physical capacity, cognition, fall history, balance or coordination impairment, and activity-limiting vision impairment. Associations between mobility device use and incident falls were also evaluated stratified according to fall history.

RESULTS

In 2011, 8.5 million (24%, 95% CI = 23.0–25.2%) adults aged 65 and older in the United States reported using any mobility device in the last month (Table 1). One-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%).

In all age groups, a greater percentage of women used any type of mobility device than of men (Figure 1), with a 19–29% difference depending on age group; 75.6% (95% CI = 69.9–80.5%) of women aged 90 and older reported some type of mobility device use in the last month. A greater percentage of women than men used canes, walkers, and wheelchairs in all age categories, although a greater percentage of men than women aged 75 and older used electric scooters. At all ages, a greater percentage of women reported multiple device use (≥2 types of mobility devices in the last month) than of 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, greater multimorbidity, and balance and coordination impairment (Table 2). Of those who reported using any mobility device, 75.7% (95%

Table 1. Prevalence of Mobility Device Use in Adults Aged 65 and Older, United States: National Health and Aging Trends Study, 2011

Device Use	n	Prevalence (95% Confidence Interval)
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)
Number 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)
Any device use (≥1)	8,506,000	24.1 (23.0–25.2)

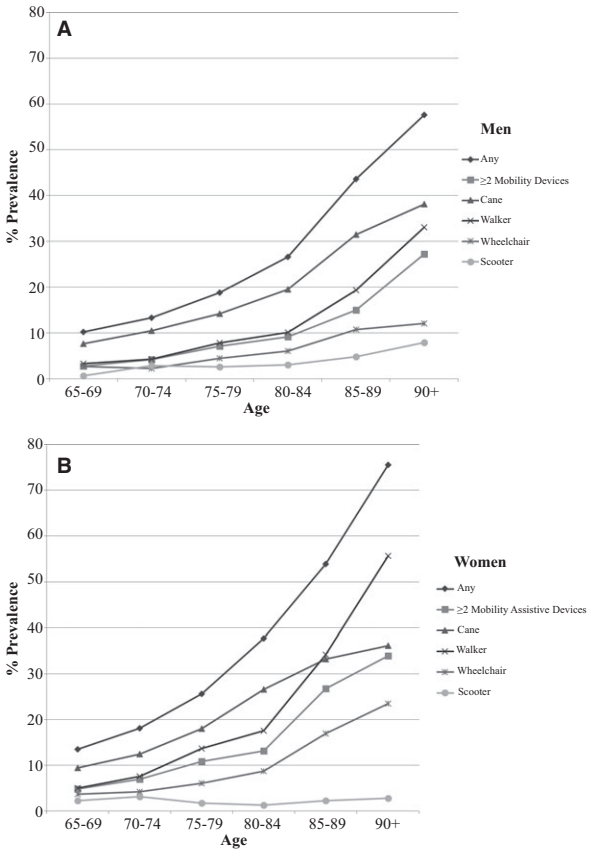

Figure 1. Prevalence of mobility device use according to age in (A) men and (B) women aged 65 and older, United States: National Health and Aging Trends Study, 2011.

Table 2. Prevalence of Mobility Device Use According to Demographic and Health Characteristics in Adults Aged 65 and Older, United States: National Health and Aging Trends Study, 2011

Characteristic	Any	Cane	Walker	Wheelchair	Scooter	≥2 Mobility Assistive Devices
	Prevalence (95% Confidence Interval)					
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 (14.0–18.0)	11.6 (9.9–13.4)	6.0 (5.1–7.2)	3.3 (2.5–4.4)	3.0 (2.1–4.2)	5.7 (4.7–6.8)
75–79	22.6 (20.7–24.6)	16.3 (14.6–18.2)	11.0 (9.2–13.2)	5.3 (4.2–6.7)	2.1 (1.5–2.9)	9.2 (7.7–11.0)
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)	1.9 (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)	3.2 (2.1–4.8)	22.4 (19.7–25.4)
≥90	70.6 (65.5–75.2)[b]	36.6 (32.3–41.2)[b]	49.5 (45–53.9)[b]	20.3 (16.9–24.2)[b]	4.2 (2.6–6.6)[a]	32.1 (27.6–36.8)[b]
Sex						
Male	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)
Female	28.1 (26.5–29.8)[b]	18.3 (17.1–19.5)[b]	14.9 (13.6–16.2)[b]	7.4 (6.7–8.3)[b]	2.2 (1.7–2.9)	11.5 (10.5–12.6)[b]
Race and 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	28.0 (24.2–32.2)	20.0 (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)[b]	16.3 (12.6–20.7)[b]	9.4 (6.8–13.0)[a]	5.7 (3.8–8.4)[a]	1.5 (0.5–4.2)	7.9 (5.5–11.2)[b]
Education						
<9 years	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)
9–11 years	29.9 (27.0–32.9)	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 (22.0–26.3)	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 or vocational	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 graduate	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)[b]	10.7 (8.7–13.1)[b]	4.9 (3.6–6.7)[b]	2.7 (1.7–4.2)[b]	1.1 (0.5–2.3)	3.6 (2.5–5.1)[b]
Weight status (body mass index, kg/m^2)						
Underweight (<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 (18.5–24.9)	22.1 (20.3–24.0)	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 (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 (≥30.0)	30.5 (28.5–32.5)[b]	21.9 (20.2–23.8)[b]	13.6 (12.0–15.3)[b]	7.1 (6.1–8.2)[b]	4.0 (3.2–5.0)[b]	11.6 (10.4–12.9)[b]
Medical conditions and impairments						
Arthritis	32.9 (31.5–34.2)[b]	23.3 (22.0–24.6)[b]	16.2 (15.1–17.3)[b]	8.1 (7.3–9.0)[b]	3.3 (2.7–4.1)[b]	13.4 (12.5–14.5)[b]
Osteoporosis	36.3 (33.7–38.9)[b]	24.6 (22.7–26.6)[b]	18.7 (16.6–21.0)[b]	10.3 (8.7–12.2)[b]	3.6 (2.6–5.0)[a]	16.0 (14.1–18.1)[b]
Hip fracture	61.1 (54.4–67.4)[b]	33.4 (28.2–39.0)[b]	42.3 (37.3–47.5)[b]	22.7 (17.7–28.7)	6.4 (3.6–11.3)[b]	32.9 (27.9–38.4)[b]
Stroke	47.9 (44.3–51.6)[b]	28.1 (24.8–31.6)[b]	26.1 (23.1–29.4)[b]	15.7 (13.2–18.6)[b]	5.8 (4.1–8.0)[b]	21.1 (18.3–24.2)[b]
Heart disease	37.9 (35.0–40.8)[b]	25.2 (22.8–27.8)[b]	19.9 (17.8–22.1)[b]	10.9 (9.2–12.9)[b]	5.3 (4.1–6.9)[b]	17.3 (15.5–19.2)[b]
Diabetes mellitus	35.0 (32.7–37.4)[b]	24.8 (22.5–27.2)[b]	17.3 (15.4–19.3)[b]	8.6 (7.6–9.8)[b]	4.2 (3.3–5.3)[b]	14.3 (12.6–16.0)[b]
Dementia	58.5 (53.0–63.8)[b]	24.4 (20.5–28.7)[b]	38.1 (32.9–38.1)[b]	27.2 (22.6–32.4)[b]	3.6 (2.1–6.1)	28.8 (24.2–33.9)[b]
Vision impairment	54.8 (50.7–54.8)[b]	31.1 (27.2–35.2)[b]	31.1 (27.2–35.7)[b]	22.0 (18.0–26.7)[b]	3.4 (2.1–5.6)	25.7 (21.2–30.7)[b]
Pain	33.4 (31.7–35.2)[b]	23.4 (22.0–24.9)[b]	16.4 (15.1–17.8)[b]	8.4 (7.4–9.5)[b]	3.6 (2.9–4.4)[b]	13.7 (12.5–15.0)[b]
Number of medical conditions						
0	5.7 (4.4–7.3)	3.9 (2.9–5.3)	2.7 (1.8–4.2)	1.1 (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)	4.7 (3.8–6.0)	2.3 (1.6–3.3)	0.7 (0.3–1.3)	3.1 (2.4–4.1)
2	19.2 (17.5–21.0)	13.9 (12.5–15.5)	8.2 (6.9–9.8)	4.0 (3.1–5.3)	1.0 (0.6–1.7)	6.5 (5.2–8.2)
3	26.9 (24.7–29.3)	18.4 (16.7–20.3)	13.0 (11.5–14.7)	6.1 (5.0–7.6)	2.6 (1.9–3.7)	10.0 (8.5–11.8)
≥4	44.4 (41.9–47.0)[b]	29.6 (27.2–32.1)[b]	22.7 (20.9–24.6)[b]	12.9 (11.6–14.4)[b]	5.2 (4.1–6.6)[b]	19.4 (17.8–21.1)[b]
Balance and 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)[b]	40.9 (37.6–44.4)[b]	36.3 (33.6–39.2)[b]	20.5 (17.9–23.3)[b]	8.3 (6.7–10.4)[b]	30.5 (27.8–33.3)[b]

P<[a].05, [b].001.

CI = 73.6–77.8%) had used one for longer than a year. The mean length of time of mobility device use was 4.0 years (range 1 month to 64 years; interquartile range: 1 month to 3 years). Of non-device users at baseline 7.9% (95% CI = 7.1–8.8%) reported using a mobility device 1 year later. Sixteen percent (95% CI = 13.3–18.1%) of mobility device users at baseline were no longer using a device 1 year later.

Incident falls and multiple falls were highest in participants with a history of device use and a history of falls (Figure 2). Of 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, and 49.6% (95% 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. Of participants with a history of falling, those who used a mobility device at baseline had a higher incidence of falling and worry about falling than those who did not use a mobility device. Of mobility device users, a

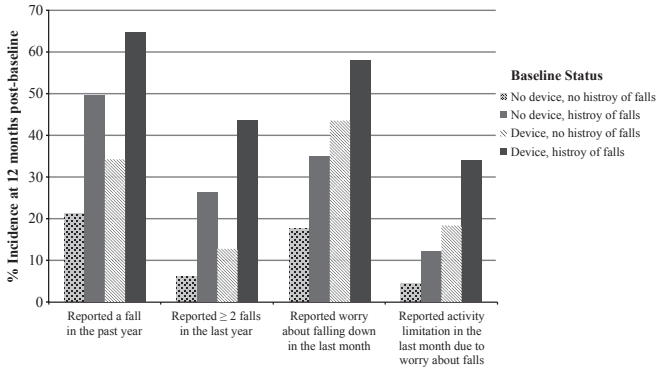

Figure 2. Incidence of falls and worry about falls 12 months after baseline according to the number of mobility devices used and fall history at baseline, United States: National Health and Aging Trends Study, 2011–2012.

greater percentage worried about falling than of 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 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 between number of devices used, duration of device use, and type of device used and incidence of falls, recurrent falls, and worry about falling in the subsequent year are shown in Table 3. There was no difference in incidence of falls or recurrent falls between older adults who used any number of mobility devices and non-device users after adjusting for demographic characteristics, medical conditions, physical capacity, cognitive function, and fall history. There was also no significant difference between those who used a device and those who did not in incidence of falls according to length of time of device use (none, ≤1 year, >1 year) at baseline or according to type of device used. Participants who used a cane or walker only did not worry about falls more than non-device users, although 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 in cane-only users than in non-device users (95% CI = 1.03–1.64). Users of more than one mobility device in the past month did not have a greater incidence of worry about falling than non-device users.

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

DISCUSSION

In this nationally representative sample, 24% of the U.S. population aged 65 and older reported using a mobility device in the last month, with one-third of all mobility device users reporting multiple device use. Consistent with previous studies, mobility device use increased with age, and women, ethnic and racial minorities, and those with lower education, lower (underweight) and higher (obese) BMI, greater disease burden, and impaired balance or coordination more commonly reported device use.[3–5] Based on data from the Health and Retirement Study, there has been a nearly 50% increase (from 16%) in the use of mobility devices since 2004.[5] Of interest is whether this is attributable to greater disability, greater longevity, correction for unmet needs in previous decades, or greater

Table 3. Association Between Mobility Device Use and Incident Falls and Worry About Falls in Adults Aged 65 and Older, United States: National Health and Aging Trends Study, 2011–2012

Device Use and Type	n (Weighted %), 2011, n = 6,047	Fall in Past Year, 2012, n = 5,939	≥2 Falls in Past Year, 2012, n = 5,934	Worries About Falling Down, 2012, n = 5,944	Worry About Falling Limits Activity, 2012, n = 5,943
		Incidence Rate Ratio (95% Confidence Interval)			
Number of mobility devices					
0	4,294 (77.3)	1.00	1.00	1.00	1.00
1	1,063 (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	4,294 (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	1,457 (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	4,294 (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 or 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)

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

acceptance and use of mobility devices among older adults. Understanding the determinants of greater use will provide insight into the training needs of older adults (whether current mobility device training standards are sufficient for safety and mobility) and whether use tracks appropriately with current needs.

Prevalence of using more than one device within a recent time frame (multiple device use) has not, to the knowledge of the authors, been described previously. Multiple device use may be related to a number of potential factors, such as environmental and terrain differences (e.g., cane for inside the home and walker for outside the home, wheelchair for navigating long distances outside the home and walker for covering short distances inside the home, different devices for different levels within the home), a change in physical capacity requiring more or less external support (e.g., hip fracture recovery with transition from walker to cane), or 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, and 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 whether multiple device use indicates better matching of device to circumstance or reflects incongruity between what is prescribed and what people 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 was not different between device and non-device users, and the use of multiple devices or any one particular mobility device did not result in a greater incidence of falls or multiple falls than non-device users. Previous studies have shown evidence of greater risk of falling with mobility device use and walker use in particular;[11–15] 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 determine whether this reduces fall risk without reducing 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 than those who used other devices. 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 of achieving this goal, given the additional risks associated with inactivity.[25] Although canes are prescribed appropriately in many circumstances, the significantly higher percentage of cane users reporting mobility restriction because of fear of falling suggests a potential mismatch between the device and the user. Canes may be better received than other mobility devices because of their low profile, ease of learning to use, lower cost, and ease of transport. It is unknown how often these factors influence the use of a cane as opposed to other devices. Repeated assessments after mobility device prescription would help identify changes in mobility (e.g., greater with external support, reduced because of 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 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, fall risk, and home environment.

An important risk factor for falling and for serious falls-related injury in 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. Half (49.6%) of those with a history of falling but no mobility device use reported a subsequent fall the following year. More than 25% of the same subpopulation had multiple falls in the second year, indicating high risk of future falls and falls-related injury. Although it is most likely that this represents a heterogeneous population in terms of function and mobility, this population had a higher incidence of subsequent falls than those who used a mobility device but had no fall history, suggesting that this subpopulation 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 customized fall reduction efforts be of additional benefit in this population? Twelve percent of this population reported limiting their activity because of 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.

This study has several limitations. Its design makes it difficult to assemble comparable populations to compare the effect of mobility device use with that of non-use on fall rates, although the analyses adjusted for many characteristics that might confound the association between mobility device and falls. 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, although the level of detail in the questions did not allow for identification of the primary device used or reasons for and circumstances

of multiple device use. Although 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, 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 yearlong recall may have resulted in underreporting of falls. A clear study strength is that the sample was representative of older, community-dwelling Medicare beneficiaries in the United States.

The percentage of older adults using mobility devices has increased over the last 3 decades, and multiple device use is common in 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 in those with a previous history of multiple falls may assist with fall prevention efforts.

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