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Footwear and Falls in the Home Among Older Individuals in the MOBILIZE Boston Study

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Abstract

Background—Whether certain types of footwear, such as slippers, socks without shoes, and going barefoot, increase the risk for falls among the elderly is uncertain. Our purpose was to examine the relationship between footwear and falls within the home in MOBILIZE Boston, a prospective cohort study of falls etiology among non-institutionalized women and men, mainly aged 70 years and older, from the Boston MA, USA area.

Methods—The 765 participants were from households randomly selected from town lists. They were followed for a median of 27.5 months. At baseline, participants were administered a questionnaire that included questions on footwear usually worn, and were given a comprehensive examination that included measurement of many risk factors for falls. During follow-up participants were asked to record each day whether they had fallen; those reporting falls were asked about their footwear when they fell.

Results—At the time of in-home falls, 51.9% of people were barefoot, wearing socks without shoes, or wearing slippers; 10.1% of people reported that their usual footwear was one of these types. Among those who fell in their own home, the adjusted odds ratio for a serious injury among those who were shoeless or wearing slippers compared to those who were wearing other shoes at the time of the fall was 2.27 (95% confidence interval 1.21–4.24).

Conclusions—It may be advisable for older individuals to wear shoes in their home whenever possible to minimize the risk of falling. Further research is needed to identify optimal footwear for falls prevention.

Keywords

Elderly; Falls; Footwear; Shoes; Population-based study; Cohort study

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Conflicts of interest
The authors have no conflicts of interest to report.

Introduction

Prevention of falls among older individuals is a major clinical and public health concern. Studies have reported that going barefoot, wearing socks without shoes, and wearing slippers are associated with increased risks for falls (1–5), particularly indoor falls (3, 4). Nevertheless, expert committees have considered the evidence insufficient to recommend changes in footwear (6).

Going barefoot, wearing socks without shoes, and wearing slippers in the home are common among older people. In a telephone survey of retired people in Seattle WA, 20% were barefoot or in socks at the time of the telephone call, and 18% were wearing slippers (7). In a survey of residents of age 65 years and older in New South Wales, Australia, Munro and Steele (8) found that 32% of the women and 28% of the men did not wear shoes around the home. Of those who did wear shoes around the home, slippers were by far the most common type of shoe. Although wearing shoes with high heels is also likely to increase the risk for falls (5, 9), very few older people wear such shoes (1, 2).

In this paper we use data from the MOBILIZE Boston Study to examine the relationship of going barefoot, wearing socks without shoes, and wearing slippers to falls in the home. We focus our paper on falls in the home because (a) findings from previous studies indicate that these footwear types are associated with indoor falls (3, 4), (b) most older people spend the vast majority of their time indoors (10), and (c) most indoor falls (76% in the current study) occur in the home.

Methods

Design, setting, and subjects

The MOBILIZE Boston Study has been described in detail elsewhere (11). Briefly, it is a prospective cohort study to identify risk factors and mechanisms of falls among 765 men and women, mainly aged 70 years and older, who live in the Boston, Massachusetts, area. Enrollment took place from September 2005 to December 2007, using door-to-door recruitment in randomly sampled households with at least one member of age 70 years or older as recorded in annual town lists required in Massachusetts. From 5655 sampled households, 4303 people of age 70 years and older were identified. Of the 4303, 1581 were not eligible and 1973 either refused to participate or were unable to be contacted. An additional 16 persons in the age group 64–69 years who were spouses or living with a participant were added to the cohort, for a total of 765 participants. Other eligibility criteria included ability to communicate in English, ability to walk twenty feet without the assistance of another person, intention to stay in the Boston area for at least two years, adequate cognition (scoring at least 18 points on the Mini-Mental Status Examination [12]), sufficient hearing acuity to take part in telephone interviews, and sufficient vision to read written material.

Data collection and definitions

At baseline participants underwent comprehensive assessments, including a home visit and a clinic examination. At the home visit, trained interviewers administered a standardized questionnaire that included questions on usual footwear. Participants were asked, “From this list of shoes, which type of shoe do you usually wear?” The list included athletic shoes (sneakers); keds or other flat-sole canvas shoe; tied oxford shoes or other tied shoe; slip-on shoes, loafers; buckle shoes; sandals; thongs or flip-flops; pumps or high-heels; work boot or other boot with shoelaces; boots (pull-on); slippers; socks, stockings, nylons or hose; barefoot, wasn’t wearing shoes; special shoe (molded, brace, Aliplast); don’t know; other.

No one responded “don’t know” or “other,” and the four instances of special shoes were combined with oxfords.

Many other attributes, including established risk factors for falls, were measured at baseline. The Berg scale was used as a measure of balance (13). Gait was assessed by walking speed (14). Physical functioning was measured by the SF12 physical functioning score (15). The PASE score was used as a measure of physical activity (16).

A fall was defined as unintentionally coming to rest on the ground or other lower level (17). During the home visit, interviewers instructed participants on how to use a calendar during follow-up to record whether a fall occurred each day. At the end of each month participants mailed their falls calendar for that month to the study office. Those not returning calendars within ten days of the end of a month or returning an incomplete calendar were called on the telephone by study staff. For those cohort members reporting one or more falls, staff performed a structured telephone interview to determine the circumstances of each fall, including the question, “What type of shoes were you wearing (if any) when you fell?,” with the same choice of responses as in the baseline interview, although in a slightly different order. A fall was considered to have resulted in an injury if the participant answered “yes” to the question “Did you hurt yourself when you fell?” We classified fractures, sprains, dislocations, and pulled or torn muscles, ligaments or tendons as serious injuries. Falls included in this study were those for which the participant selected “inside own home” as the best description of the location of the fall.

The data presented here are based on follow-up through April 30, 2009. The median length of follow-up was 27.5 months, with a range of 0.5 to 44.4 months. Ninety-seven percent of the participants had 6 or more months of follow-up, and 93 percent had at least a year of follow-up.

Statistical analysis

The STATA 10.1 (StataCorp, College Station TX) statistical package was used in all analyses. The negative binomial regression model, which takes into account length of follow-up, was employed to examine the associations between usual footwear and rate of in-home falls (number of in-home falls per unit calendar time). It was decided *a priori* to adjust for age and gender in all analyses. To control for confounding by other variables in the negative binomial regression model and in the logistic regression model described below, it was planned to include all variables that changed the rate ratio or odds ratio by 15% or more. However, none of the more than 40 variables considered met this criterion for confounding.

Following our consideration of usual footwear, we present the distribution of what participants said they were wearing on their feet at the time of the fall. We had no comparable information about footwear worn at a specific point in time from participants who did not fall, so as a secondary analysis we compared the distribution of footwear at the time of in-home falls to the distribution of usual footwear. Because older people spend the vast majority of their time indoors (10), in most instances the usual footwear should be their usual indoor footwear. The observed distributions of footwear at the time of falls in the home (all falls, first falls, second falls) were compared to the distribution expected from usual footwear with (a) the usual footwear of all participants as the referent and (b) the usual footwear of persons having one or more falls in the home as the referent. P-values were obtained from the test of equivalence of proportions. Males and females were initially considered separately; however, no differences in footwear-fall associations were found between males and females, so they were combined in these analyses. In addition, proportions were compared within selected subgroups of the study population, including age

group, SF 12 physical functioning score, Berg balance score, extent of medication adherence, foot pain, and a history of one or more falls in the past year.

Finally, logistic regression was used to estimate the odds of an injury among those going barefoot, wearing socks without shoes, or wearing slippers at the time of a fall within the home compared to those wearing other footwear at the time of the fall.

Results

Table 1 presents characteristics of the cohort at baseline. The median age was 78 years, with a range of 64 to 97 years. The usual footwear worn was reported to be athletic, oxford, or loafer/slip-on by the majority of participants.

Among the 765 cohort members, 1647 falls among 485 people were reported during this period of follow-up. Confirmation of fall-to-the-ground and identification of footwear at the time of falls was obtained for 1363 (82.7%) of the falls. Of these, 563 (41.3%), among 279 people, had occurred in the faller's own home.

Rate ratios of falls within the home according to the footwear usually worn, adjusted for age and gender, are shown in Table 2. Whether nine categories of footwear were compared, or just the category of bare feet, socks with no shoes, and slippers versus all other footwear, no association between usual footwear and rate of falls within the home was apparent.

As shown in Table 3, about 52% of falls within the home occurred among people wearing slippers or socks or who were barefoot at the time of the fall. This percentage is substantially higher than the approximately 10% who reported that their usual footwear was slippers, socks without shoes, or going barefoot among either the entire study population or just the people who reported one or more in-home falls (Table 3). The high percentage of falls that occurred when people were going barefoot, wearing socks without shoes, and wearing slippers persisted when participants were divided into various subgroups for analysis, such as by age, balance score, physical functioning, foot pain, and a history of falls in the past year. This high percentage was also seen if only first falls or only second falls were considered, and if falls attributed to bad lighting, wet surfaces, fainting, medical problems, dizziness, and being knocked down were excluded (data not shown).

Persons going barefoot, wearing socks without shoes, or wearing slippers did not have increased odds of injuring themselves during a fall in their home when all injuries were considered. However, when only serious injuries were included (fractures; sprains; dislocations; pulled or torn muscles, ligaments or tendons), people going barefoot, wearing socks without shoes, or wearing slippers had an odds ratio of 2.27 (1.21–4.24) when adjusted for age and gender. When falls attributed to bad lighting, wet surfaces, fainting, medical problems, dizziness, and being knocked down were excluded, the adjusted odds ratio for serious injury was 8.61 (2.45–30.23). Trends were similar among females and males and in all age groups.

Discussion

Among the various important components of falls etiology are problems with balance and gait (6, 18–22) and slipping (5, 23, 24), all of which can be affected by going barefoot, wearing socks without shoes, or wearing slippers (5, 25–27).

Previous studies have reported that fall risk is markedly increased when older persons are barefoot or in stocking feet (1, 3, 5). Koepsell et al. (1) reported an adjusted odds ratio of 11.2 (2.4–51.8) for going barefoot or being in stocking feet after controlling for measures of

health status and other factors, while Menz et al. (3) noted an adjusted odds ratio of 13.7 (3.9–48.6) for indoor falls. Two studies (28, 29) have reported that balance is adversely affected when people are barefoot. Also, stocking feet may provide poor friction and thus be more prone to slipping (1). One laboratory study (30) found that being barefoot was associated with good balance performance, but this finding may not apply to free-living individuals in their usual surroundings. People who are barefoot or wearing socks without shoes may also be more prone to falls as a result of slipping or trauma from unexpected contact (3).

Although Koepsell et al. (1) found only a weak association between wearing slippers and risk for falls, Kerse et al. (31) noted that usually wearing slippers compared to soft-soled shoes increased the risk for injurious falls in older people, while Sherrington and Menz (2) reported that slippers were the most common type of footwear worn at the time of fall-related hip fractures. Larsen et al. (4) reported an association between walking in socks without shoes or in slippers without a sole and falls in women, and between walking in slippers of unsuitable size and slippers not sticking closely to the feet and falls in men. Munro and Steele (8) have pointed out that while slippers are easy to put on the feet and are soft, comfortable, and inexpensive, they tend to lose their shape, and frequently have slippery vinyl soles, thus providing an insecure base for gait. Menz et al. (25) found that slip resistance of the outersole of footwear is likely to be important in reducing the risk of falls.

Several authors (3, 6) have emphasized the need for experimental studies of various footwear types, with falls as an outcome, to be able to provide better evidence about optimal footwear for older people. Recommendations such as wearing well-fitting, low-heeled shoes with slip-resistant soles seem sensible, but there is only limited data to support this advice (3). Designing optional shoes will also need to take into account such issues as accommodation to foot problems and ease of putting shoes on and taking them off (7).

Apparently no other studies have considered the odds of an injury in relation to footwear worn at the time of a fall. The finding in this study of a greater likelihood of serious injury among those in bare feet or wearing slippers or socks without shoes should be evaluated in other studies.

Strengths of this study include its longitudinal design, its sampling from the general population, its relatively large sample size, its careful measurement of many risk factors for falls, and detailed documentation of place and activity at the time of falling. However, the primary aims of the MOBILIZE Boston Study did not include examining the association between footwear and falls, so that achieving the objectives of this substudy necessitated using data not collected for this specific purpose. The study of Koepsell et al. (1) gathered information on the footwear of individuals at the time of their fall and, as a comparison group, used individuals who were performing similar activities but did not fall. No such comparison group was available in the current study, so we had to compare the distribution of footwear at the time of falls in the home to the distribution of reported usual footwear. This comparison could be somewhat biased, however, and should not be considered definitive. If, for instance, some of the falls occurred at night when people were getting up to go to the bathroom, they would be expected to be wearing slippers or going barefoot, and not wearing their usual footwear. In addition, separate questions were not asked about footwear usually worn indoors and outdoors; however, because older people spend the vast majority of their time indoors (10), their usual footwear would likely be what they wear indoors in their home. We did not obtain detailed information on characteristics of footwear that might affect balance, gait, and tendency to slip, such as hardness and tread of the sole, heel geometry, adequacy of fit and degree of wear, heel collar height, and sole/surface contact area (3, 5, 9, 25, 26, 29). Also, the question about usual footwear (“From this list of

shoes, which type of shoe do you usually wear?") was slightly different from the question about footwear worn at the time of the fall ("What type of shoes were you wearing (if any) when you fell?"). The same types of footwear were listed, but in a slightly different order. If people tended not to think of bare feet, socks without shoes, and slippers when answering the question about usual footwear, then our data may underestimate the number of people in these categories in the usual footwear comparison group. Another issue is that the participants were not asked why they were wearing their particular footwear, as they could have selected footwear for reasons related to likelihood of falling. However, adjusting in the analysis for other risk factors did not change the associations found in these analyses. The study relied on self-report of falls and footwear, and some error in reporting undoubtedly occurred. Finally, the study was undertaken in the Boston MA area. Although in the Boston area the distributions of characteristics such as age, gender, and race are similar in the town lists (from which this study population was sampled) and the U.S. Census (11), results may not be generalizable to other localities.

Nevertheless, taken together, available evidence indicates that older people going barefoot, wearing only socks, or wearing slippers may be at considerably increased risk for falls in their homes. The data from several studies are quite consistent, the magnitude of the increased risk high, and biologic mechanisms plausible. Therefore, on the basis of this and other studies, we suggest that advice about wearing shoes whenever possible be included in fall prevention programs. More research is needed on the design of acceptable and comfortable footwear that provides optimal safety for older people.

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Ethical approval

This study was approved by the Institutional Review Board of Hebrew SeniorLife (HSL IRB Protocol # 05-011). All participants received an information sheet and signed a consent form.

References

1. Koepsell TD, Wolf ME, Buchner DM, et al. Footwear style and risk of falls in older adults. J Am Geriatr Soc. 2004; 52:1495–1501. [PubMed: 15341551]
2. Sherrington C, Menz HB. An evaluation of footwear worn at the time of fall-related hip fracture. Age Ageing. 2003; 32:310–314. [PubMed: 12720618]
3. Menz HB, Morris ME, Lord SR. Footwear characteristics and risk of indoor and outdoor falls in older people. Gerontology. 2006; 52:174–180. [PubMed: 16645298]
4. Larsen ER, Mosekilde L, Foldspang A. Correlates of falling during 24 h among elderly Danish community residents. Prev Med. 2004; 39:389–398. [PubMed: 15226051]
5. Menant JC, Steele JR, Menz HB, Munro BJ, Lord SR. Optimizing footwear for older people at risk of falls. J Rehabil Res Dev. 2008; 45:1167–1181. [PubMed: 19235118]
6. American Geriatrics Society, British Geriatrics Society, American Academy of Orthopaedic Surgeons Panel on Falls Prevention. Guideline for the prevention of falls in older persons. J Am Geriatr Soc. 2001; 49:664–672. [PubMed: 11380764]
7. Dunne RG, Bergman AB, Rogers LW, Inglin B, Rivara FP. Elderly persons' attitudes towards footwear—a factor in preventing falls. Public Health Rep. 1993; 108:245–248. [PubMed: 8464983]

8. Munro BJ, Steele JR. Household-shoe wearing and purchasing habits: A survey of people aged 65 years and older. J Am Podiatr Med Assoc. 1999; 89:506–514. [PubMed: 10546422]
9. Tencer AF, Koepsell TD, Wolf ME, et al. Biomechanical properties of shoes and risk of falls in older adults. J Am Geriatr Soc. 2004; 52:1840–1846. [PubMed: 15507060]
10. Robinson JP, Silvers A. Measuring potential exposure to environmental pollutants: time spent with soil and time spent outdoors. J Expo Anal Environ Epidemiol. 2000; 10:341–354. [PubMed: 10981728]
11. Samelson EJ, Kelsey JL, Kiel DP, et al. Issues in conducting epidemiologic research in elders: Lessons from the MOBILIZE Boston Study. Am J Epidemiol. 2008; 168:1444–1451. [PubMed: 18953059]
12. Folstein MF, Folstein SE, McHugh PR. “Mini-mental state”. A practical method for grading the cognitive state of patients for the clinician. J Psychiatr Res. 1975; 12:189–198. [PubMed: 1202204]
13. Berg KO, Maki BE, Williams JI, Holliday PJ, Wood-Dauphinee SL. Clinical and laboratory measures of postural balance in an elderly population. Arch Phys Med Rehabil. 1992; 73:1073–1080. [PubMed: 1444775]
14. Guralnik JM, Ferrucci L, Pieper CF, et al. Lower extremity function and subsequent disability: consistency across studies, predictive models, and value of gait speed alone compared with the short physical performance battery. J Gerontol A Biol Sci Med Sci. 2000; 55:M221–M231. [PubMed: 10811152]
15. Stewart AL, Hays RD, Ware JE. The MOS Short-form General Health Survey. Reliability and validity in a patient population. Med Care. 1988; 26:724–732. [PubMed: 3393032]
16. Washburn RA, McAuley E, Katula J, Mihalko SL, Boileau RA. The physical activity scale for the elderly (PASE): evidence for validity. J Clin Epidemiol. 1999; 52:643–651. [PubMed: 10391658]
17. Kellogg International Work Group on the Prevention of Falls by the Elderly: The prevention of falls in later life. Dan Med Bull. 1987 Apr.34 Suppl 4:1–24.
18. Tinetti ME. Clinical Practice. Preventing falls in elderly persons. New Engl J Med. 2003; 348:42–49. [PubMed: 12510042]
19. Close JC, Lord SL, Menz HB, Sherrington C. What is the role of falls? Best Practice & Research Clin Rheumatol. 2005; 19:913–935.
20. Rubenstein LZ. Falls in older people: epidemiology, risk factors and strategies for prevention. Age Ageing. 2006; 35:S2:ii37–S2:ii41.
21. Ganz DA, Bao Y, Shekelle PG, Rubenstein LZ. Will my patient fall? JAMA. 2007; 297:77–86. [PubMed: 17200478]
22. Berg WP, Alessio HM, Mills EM, Tong C. Circumstances and consequence of falls in independent community-dwelling older adults. Age Ageing. 1997; 26:261–268. [PubMed: 9271288]
23. Sjögren H, Björnstig U. Injuries among the elderly in the home environment: detailed analysis of mechanisms and consequences. J Aging Health. 1991; 3:107–125.
24. Björnstig U, Björnstig J, Dahlgren A. Slipping on ice and snow -- elderly women and young men are typical victims. Accid Anal Prev. 1997; 29:211–215. [PubMed: 9088360]
25. Menz HB, Lord SR, McIntosh AS. Slip resistance of casual footwear: Implications for falls in older adults. Gerontology. 2001; 47:145–149. [PubMed: 11340320]
26. Menant JC, Perry SD, Steele JR, Menz HB, Munro BJ, Lord SR. Effects of shoe characteristics on dynamic stability when walking on even and uneven surfaces in young and older people. Arch Phys Med Rehabil. 2008; 89:1970–1976. [PubMed: 18760402]
27. Lord SR, Bashford GM, Howland A, Munroe BJ. Effects of shoe collar height and sole hardness on balance in older women. J Am Geriatr Soc. 1999; 47:681–684. [PubMed: 10366166]
28. Robbins S, Gouw GJ, McClaran J. Shoe sole thickness and hardness influence balance in older men. J Am Geriatr Soc. 1992; 40:1089–1094. [PubMed: 1401691]
29. Horgan NF, Crehan F, Bartlett E, et al. The effects of usual footwear on balance amongst elderly women attending a day hospital. Age Ageing. 2009; 38:62–67. [PubMed: 19001558]
30. Lord SR, Bashford GM. Shoe characteristics and balance in older women. J Am Geriatr Soc. 1996; 44:429–433. [PubMed: 8636591]

31. Kerse N, Butler M, Robinson E, Todd M. Wearing slippers, falls and injury in residential care. Aust NZ J Public Health. 2004; 28:180–187.

Table 1

Percentage distribution of the study population at baseline by selected characteristics*

Characteristic		Percentage
Age (years)	64–69	2.1
	70–79	60.4
	80–89	34.4
	90–97	3.1
Number of falls in past year	0	62.5
	1–2	30.2
	3–5	5.7
	>5	1.6
Gender	Male	36.1
	Female	63.9
Race/	American Indian/Alaskan	0.5
Ethnicity	Asian	1.3
	Black	15.8
	White	78.0
	Other	2.1
	Multi	2.2
Education	Less than high school	11.1
	High school/GED	23.0
	Some college, technical school	19.2
	College graduate	15.6
	Graduate degree	31.0
Usual footwear**	Slippers	7.7
	Bare feet	1.2
	Socks/nylons	1.2
	Athletic	36.1
	Oxfords	26.1
	Loafers	21.7
	Sandals	3.4
	Pumps	1.3
	Boots	1.3

* N=765 except for number of falls in past year (N=761), and race/ethnicity and education (N=764)

** Athletic footwear includes athletic shoes, sneakers, and canvas flats; oxfords include tied oxford shoes, buckle shoes, and orthopedic (special) shoes; loafers include loafers and slip-ons; sandals include sandals, thongs, flip-flops, and clogs; pumps include pumps and high heels; boots include work boots, other laced boots, and pull-on boots.

Table 2

Adjusted* rate ratios for falls within the home according to usual footwear reported at baseline (N=765)

Usual footwear	Rate Ratio	95% Confidence Interval
2-category classification of footwear#		
Referent group (all others combined)	1.00	
Slippers + bare feet + socks	0.96	0.62 to 1.50
9-category classification of footwear§		
Referent group (athletic shoes)	1.00	
Slippers	0.92	0.54 to 1.58
Bare feet	1.17	0.34 to 4.04
Socks without shoes	1.34	0.44 to 4.02
Oxfords	0.93	0.66 to 1.31
Loafers	1.16	0.82 to 1.64
Sandals	1.45	0.73 to 2.91
Pumps	0.70	0.18 to 2.75
Boots	2.18	0.77 to 6.18

*Adjusted for age (continuous) and gender by negative binomial regression.

#Referent group: athletic shoes, oxfords, loafers, sandals/thongs, pumps, and boots combined.

§Referent group: athletic shoes, which include athletic shoes, sneakers, and canvas flats. Oxfords include tied oxford shoes, buckle shoes, and orthopedic (special) shoes; loafers include loafers and slip-ons; sandals include sandals, thongs, flip-flops, and clogs; pumps include pumps and high heels; boots include work boots, other laced boots, and pull-on boots.

Table 3

Percentage distribution of footwear at time of falls within the home and frequency distribution of usual footwear among all study participants, and those who had one or more falls within the home during follow-up

Footwear type	Footwear at time of fall (N=563 falls)	Usual footwear, all participants (N=765)	Usual footwear, participants with one or more falls (N=279)
2-category classification of footwear*			
Slippers + bare feet + socks	51.9	10.1†	10.4†
All others	48.1	89.9†	89.6†
9-category classification of footwear#			
Slippers	26.6	7.7†	7.5†
Bare feet	18.3	1.2†	0.7†
Socks	6.9	1.2†	2.2†
Athletic	25.8	36.1†	35.8†
Oxfords	10.5	26.1†	24.7†
Loafers	7.5	21.7†	21.9†
Sandals	3.9	3.4	4.7
Pumps	0.2	1.3	1.4
Boots	0.4	1.3	1.1

*1st category includes slippers, bare feet, and socks without shoes; 2nd category, all others, includes athletic shoes, oxfords, loafers, sandals/ thongs, pumps, and boots.

#Athletic includes athletic shoes, sneakers, and canvas flats; oxfords include tied oxford shoes, buckle shoes, and orthopedic (special) shoes; loafers include loafers and slip-ons; sandals include sandals, thongs, flip-flops, and clogs; pumps include pumps and high heels; boots include work boots, other laced boots, and pull-on boots.

†Equivalence of proportions test: p<.0055 under the null hypothesis that this footwear type has equal proportions in the footwear-at-fall distribution and usual-footwear distribution. The p-value criterion takes multiple comparisons of the nine footwear types into account (.0055=.05/9).