



Fall Prevention
Community of Practice
ADULT+JUNIOR

Loop Evidence Summary: Sex and Gender Differences in Falls

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Purpose

The following Loop evidence summary focuses on differences in falls between men and women. These include sex/gender differences in the incidence and prevalence of falls, exposure to fall-related risk factors, perceptions about falls, and fall prevention and fall risk avoidance strategies. The summary also describes equity-related issues and implications arising from sex/gender differences in falls and concludes with implications for research and practice.

Focusing on sex/gender differences in falls can yield important insights to guide strategies for the prevention and management of falls and fall risks. For example, identifying the mechanisms behind differences related to fall perceptions between men and women can inform the development of fall prevention messaging and programing that is more gender relevant and potentially more effective [1].

When reviewing the scientific literature on fall-related differences between men and women, one important distinction to keep in mind are the meanings of the descriptor terms **sex** and **gender**. Sex refers to biological classification based on reproductive organs. Conversely, gender refers to socially constructed beliefs and value systems that form the basis of gender identity and gender stereotypes or traits that are regarded as feminine or masculine [2]. Throughout this summary, the author has used the terminology (sex or gender) employed by the authors of the cited studies, although the conventional nomenclature about the use of the terms sex versus gender is not always stated or followed.

Overview of Sex Differences in Falls

Cross sectional data collected from community dwelling older adults generally indicate that women are at greater risk of falling than their male counterparts [3-6]. For example, a study of 508 community dwelling older adults (65+) found that a significantly greater proportion of women experienced fall episodes within the past year (83.9% vs. 73.1%, $p < .04$) [4]. A similar pattern was observed in a study of 485 older adults (65-80 years) attending diabetic outpatient clinics in Taiwan. The risk of falls in females, which was measured by self-reported fall history over the previous year, was 1.75 times that of males after controlling for other risk factors [5].

Women also appear to be at greater risk of injurious falls [1,7]. Women are more likely to sustain fall-related fractures [8-10]. Moreover, women are twice as likely to experience fall-related hospital and emergency department admissions, although fall-related mortality is disproportionately greater among men [11-13].

While community dwelling older adult women tend to be at greater risk of both falls and their deleterious consequences, the pattern of sex differences in falls shifts with age and diminished levels of independence. Specifically, greater proportions of falls are reported among men who are: 100 years of

age or older [14], living in nursing homes [15], in hospital settings [16], or undergoing post-hospital discharge [17].

Being male was also flagged as a risk factor in a study focusing on falls in young adults. Over a sixteen-week period, 414 undergraduate students at an American university responded to daily emails asking them if they had slipped, tripped, or fallen over the past 24 hours. The reported frequency of falls was positively associated with being male, physical activity levels and number of medications. Although male students were more likely to report a fall, only female students sustained serious injuries (fractures and concussions) requiring medical treatment. However, there were insufficient observations of these injuries to conduct tests for statistical significance [18].

Sex/Gender Differences in Fall-Related Risk Factors and Perceptions of Falls

Health Status and Comorbidities

A growing body of evidence suggests that men and women have different risk profiles with respect to the comorbidities and health status indicators associated with falls. Data from the Swedish National Study on Aging and Care, a prospective cohort study of over 3,000 community dwelling older adults (age 60+), found that in the short term (< 4 years), daily functional dependency (i.e., need for assistance with living activities such as bathing), and previous falls were independently associated with injurious falls in women. Long term (4-10 years) risk factors associated with fall-related injuries in women included being underweight, cognitive impairment, daily functional dependency, and medication use. Among older men, short term risk factors associated with injurious falls included low systolic blood pressure, impaired chair stands and previous falls, while long term risk factors included smoking, heart disease, impaired balance and fall history [19].

A fall risk profile developed from the English Longitudinal Study of Aging, which, like the Swedish study, drew on over 3,000 community dwelling older adults (age 60+), found that age was the only factor associated with increased risk of falls in both sexes. Incontinence and depressive symptoms were more predictive of falls among women, while greater comorbidities, higher pain levels and poorer balance (measured by the inability to execute a full tandem stand) were associated with a higher risk of falls among men. However, only the relationships between pain, balance, and comorbidities and fall incidence demonstrated significant sex differences [20].

Both loss of skeletal muscle mass (aka sarcopenia) and obesity are known risk factors for falls but most studies have not found associations between sex differences in these conditions and fall incidence. A four-year prospective study of 307 community dwelling older adults (age 60+) in New Mexico found no direct association between falls and body composition among males or females. However, there were

sex differences between body composition and worsening balance and gait. Specifically, lean body mass, especially with sarcopenia, was more strongly correlated with balance deficits in older men, while fat mass (obesity) was more strongly associated with balance deficits among older women [21].

There is a dearth of studies focused on sex differences in fall-related risk factors among community dwelling older adults seeking medical attention after a fall [22]. A Canadian study (N=462) found that community dwelling older males seeking medical attention after a fall fell more than their female counterparts. Four risk factors were identified: impaired cognition and mobility, low mood and self-efficacy, perceived poor health, and mobility resilience, defined by the study as maintained mobility despite the presence of comorbidities. Among men, mobility resilience was less protective of falls compared to women. The study authors attribute this finding to poorer executive function among males, which contributes to poorer judgement or slower decision-making during mobility [23].

Type of Falls

The capacity to perform stair descent, an essential form of daily locomotion, is one of the most challenging and potentially hazardous activities performed by older adults [24, 25]. In a study of age and gender differences in balance control, 47 older adults and 38 young adults performed a descent from one step onto a foam mat. Women exhibited higher values of centre of pressure (CoP) sway and velocity in both directions with age. Older men, by contrast, presented greater values of CoP sway and velocity only in the anteroposterior direction. This could be interpreted as an indicator that men are at higher risk of forward falls with advancing age, whereas women are at higher risk of both forward and sideways falls [25].

Environmental Risk Factors and Physical Activity Patterns

A comprehensive study of the environmental circumstances associated with fall-related injuries relied on narrative texts from over 400,000 respondents to the National Health Interview Survey, a population-based survey conducted by the US National Center for Health Statistics [26]. The texts were coded using a customized taxonomy assessing place, activity, initiating event, fall-related hazards, and work-relatedness [27].

Men in all age groups reported a higher proportion of outdoor fall injuries, while the proportion of indoor fall injuries was higher among women. Walking was the most widely reported activity preceding a fall in all gender-age groups with the exception of young men. Among women, using the stairs was the second leading activity at time of fall-related injury. The incidence of fall injuries as a result of using ladders was highest among middle-aged men. Women were more likely to trip than men in every age group, a finding which may be related to sex differences in gait [28-30]. The increased incidence of tripping among women was also found in the aforementioned study of falls among young people (age

18-27) by Cho and colleagues [18]. Large objects (e.g., furniture), stairs and steps, and surface contamination (e.g., icy sidewalks) were the three most common fall-related hazards across all gender/age groups [27].

Other studies identify two additional environmental factors that may be associated with sex differences in falls among community dwelling older adults. First, females are more likely to fall during the winter months while males are more likely to fall during the summer, a finding that may be attributable to sex differences in daily routines [31, 32]. Second, one cross sectional study identified sex differences in type of footwear worn at the time of fall, with women more often wearing slippers while men tended to be wearing shoes. This finding led the authors to conclude that some older adults are not wearing their shoes properly, or are not wearing suitable shoes (i.e., closed toe, rubber-soled) that lower the risk of falls [32].

Given the importance of exercise for preventing falls among older adults, a relevant intervention issue is the extent to which men and women who experience frequent falls develop different physical activity patterns compared to those who fall sporadically or not at all. This was the focus of a study by Stahl and Albert, who obtained self-reported fall data and validated measures of physical activity at baseline, and 6 and 12 month follow up periods from 1,487 older adults (age 50+) attending seniors' centers across Pennsylvania. Men who fell frequently reported decreases in recreational/leisure activity and household/yard work compared to intermittent fallers and non-fallers. Women, by contrast, maintained similar levels of recreational/leisure activities and household/yard work regardless of their self-reported fall frequency. The one activity exception was walking, which decreased among frequent fallers of both sexes [33].

The aforementioned study by Cho and colleagues provides some insight into the circumstances and physical activity patterns contributing to falls in younger adults [18]. All of the fall-related injuries among young males occurred during higher risk activities, such as sports (86%) or while running/jogging (14%). Conversely, 38 percent of young females reported that their fall-related injuries occurred while walking. This may, in part, be due to females being more likely to report footwear as the cause of their fall than men. Females were twice as likely as males to report talking at their time of fall, which possibly indicates greater levels of cognitive demand during locomotor multitasking on the part of females. The authors present three alternate hypotheses for this phenomenon: females being more balance compromised than men when talking at the time of a fall; a greater likelihood of females talking during daily activities; and females being more likely to recall talking than their male counterparts [18].

Fear of Falling

Fear of falling (FOF) refers to ongoing concern about sustaining a fall that, in turn, causes an individual to avoid daily activities [34]. If left untreated, persistent FOF has been associated with deconditioning,

social isolation, depression, more frequent falls, greater frailty, decline in mobility and increased mortality [35-38].

Earlier studies reported lower self-reported levels of FOF among men than women, a finding that was attributed to gender roles and social constructions of masculinity that led to a stigma against men expressing fear [39, 40]. However, more recent evidence reveals that FOF is a fall-related risk factor among both men and women, which indicates that gender-specific norms may be changing over time [41, 42]. A recent study of 485 older adults (65-80 years) conducted by Wang and colleagues found that fear of falling was the predominant risk factor for falls among males [5]. Moreover, as was noted previously, men who are categorized as 'frequent fallers' are more likely to curtail routine physical activities than female frequent fallers [33]. This may be attributable to FOF exerting a significant effect on the behaviour of male fallers.

Perceptions of Falls and Fall Prevention Activities

Qualitative studies have revealed gender differences in older adults' perceptions of falls, as well as gender differences in their preferences for, and participation in, fall prevention activities. Women tend to become aware of falling through their role as caregivers [43], a finding supported by men appearing to rely on women for encouraging participation in fall prevention programs as females are regarded as assuming the role of health motivators [44].

When queried about their susceptibility to falling, both men and women cited home or environment-related extrinsic factors more frequently than medical or health problems. However, men were more likely to identify extrinsic factors outside of the home (e.g., safety on ladders), while women were more likely to discuss measures to mitigate indoor risks, such as holding on to stair rails and removing throw rugs [43].

Research on gendered views of older adults towards fall prevention exercise is limited: a systematic review on the topic conducted by Sandlund and colleagues found that only five of the 25 retrieved articles included some sort of gender analysis [45]. A series of focus groups conducted with community dwelling older adults in the US revealed gender differences in motivation for exercising to prevent falls. While maintaining good health was a motivating factor for both genders, women spoke about preserving health as a necessity for managing their everyday responsibilities. Men, by contrast talked about exercise in terms of keeping fit [46].

Women are more likely than men to participate in exercise programs designed to prevent falls [47, 48]. But this is not necessarily due to a lack of interest on the part of men, given that older men express a willingness to engage in conversations about fall prevention. Older men also acknowledge personal vulnerabilities and a desire to remain independent [49]. A mixed methods study conducted by Anderson and colleagues on barriers to participation by older men in exercise programs revealed several key themes, including women outnumbering men, conflict between male gender roles and the nature of the

programs (which were viewed as 'feminine'), and a preference for participating in other types of physical activity [50].

Equity-Related Issues arising from Sex/Gender Differences in Falls

Comparatively little research has focused on associations between the social determinants of health and gender inequities in the incidence of falls and fall-related injuries. Population level studies generally find that older adults suffering recurrent falls are more likely to have lower income, lower education, and higher levels of social deprivation. They are also more likely to dwell in homes in need of significant repairs and live in neighbourhoods with features conducive to fall risk, such as poorly maintained sidewalks [51, 52]. One Canadian study found that severe food insecurity was associated with higher rates of non-intentional injuries including falls [53]. Socio-economic deprivation appears to negatively impact the fall risk of both sexes. However, one could argue that females are disproportionately affected by the social, economic, and environmental conditions contributing to falls given that older women in Canada (65+) are significantly more likely to live in low-income households [54].

Fall-related health inequities affecting men arise from concerns that falls research is highly female-focused, with an over-representation of women in most studies [55-57]. Consequently, the needs, preferences and priorities of men are not sufficiently represented in falls research [58]. The lack of male voices in fall-related research has led to the perpetuation of inaccurate gender stereotypes, such as men not needing, or being interested in, fall prevention information [45]. Gender inequities in falls research, much of which is focused on guiding preventive interventions, appears to have exerted a spillover effect into fall prevention practice: as was noted previously, females comprise a majority of participants in exercise programs to prevent falls [47, 48], and men feel that the content of these programs do not reflect their own interests and preferred modes of physical activity [50].

Implications for Research and Practice

Research on falls traditionally regarded sex as a moderating factor and focused on assessing the relative contribution of sex towards falls and fall risks [1, 43]. More recent studies have further explained how sex and gender differences impact key domains related to falls and fall prevention. These include differences in how men and women perceive their risks for falls and adopt strategies to prevent falls. Increased understanding of differences in the fall-related knowledge, attitudes and behaviours of men and women is a critical prerequisite for developing effective interventions that prevent falls and promote healthy aging among older adults [43].

Future directions for gender-based falls research should include the development of and pilot testing of fall risk assessments and interventions that consider gender differences in older adults' approach to fall prevention [43]. More research is also needed to better understand gender differences in the dynamic relationship between key risk factors contributing to falls, such as mobility and cognition [23].

The disproportionate focus on women in both falls research and fall prevention interventions is arguably a necessity-driven health inequity, since women comprise an increasing percentage of the aging population due to a higher life expectancy. This makes older women a key priority group for interventions aimed at preventing falls [59]. This demographic reality, however, does not negate the need for a greater focus on attracting older men to fall prevention programs. Increasing male participation in exercise classes and other fall prevention initiatives requires a greater consideration of how these programs are designed and promoted, accounting for the interests and preferences of older men as well as older women [45]. Targeted marketing alone has the potential to foster positive impacts on male participation in exercise classes to prevent falls: 90 percent of men responding to a survey on barriers to participation in these classes felt that advertisements featuring men would increase their involvement [50].

Last, both men and women would benefit from a greater focus on the social, economic, and environmental determinants of falls, such as financial status, home safety and neighbourhood conditions. The importance of these factors for healthy aging and well-being have been long understood, yet fall prevention continues to be weighted heavily towards clinical and individual-level interventions [60]. Initiatives addressing falls arising from deficits in access to the social determinants of health have the potential to prevent falls while promoting healthy aging and a greater quality of life for older adults.

Summary

Studies generally reveal that women are at greater risk of falling than men and are also more prone to fall-related injuries and hospitalizations. Women and men have different risk profiles for the comorbidities and health status indicators associated with falls. They also differ according to some of the environmental risk factors and physical activity patterns (e.g., men reporting a higher proportion of outdoor injuries) related to falls. Fear of falling is evident in both older men and women at risk. Women are more likely to participate in exercise programs and other fall prevention activities, a finding that some have attributed to these initiatives being geared to the interests and preferences of females. Both men and women suffering from key measures of social-economic deprivation (e.g., low income, substandard housing) are more likely to suffer from falls and fall-related injuries. Future research should include the development and pilot testing of assessments and interventions that consider gender differences in older adults' approaches to dealing with fall prevention, while the field of fall prevention practice should focus on strategies for attracting more male participants. Last, both men and women at risk of falls would benefit from a greater focus on initiatives addressing falls arising from inequitable access to the social determinants of health.

Key Loop Resources on Gender Differences in Falls

Loop Discussion Threads

Men more likely to die from falls than women says 2015 Injury Deaths in Canada report (June 19, 2019)

This discussion post describes a report summarizing Public Health Agency of Canada (PHAC) data on Canadian injury deaths in 2015. PHAC determined that the ASRs [age-standardized rates] associated with falls found that male deaths exceed female deaths. This was attributed to the fact that there are more 60+ females than males in Canada, and that fall-related mortality rises significantly in the older population.

<https://www.fallsloop.com/discussions/11156>

Modifying and orienting interventions and services to reduce health disparities for marginalized and priority populations (May 19, 2017)

This discussion post addresses the importance of ensuring that health disparities affecting marginalized populations are considered in the planning and evaluation of fall prevention programs. It notes the importance of reflexive practice, critical reflection where practitioners become aware of and examine their underlying values, assumptions and beliefs, when identifying how a fall prevention program may unintentionally privilege or disadvantage different groups. It also provides case study examples and links to health equity resources and assessment tools.

<https://www.fallsloop.com/discussions/10623>

Falls from Ladders in Ontario (November 18, 2016)

This discussion post provides tips for preventing falls from ladders, a risk factor that disproportionately affects middle-aged men. It also describes the results of *DIY Falls: Take Time Before You Climb*, a 2014 New Zealand campaign aimed at preventing ladder-related falls.

<https://www.fallsloop.com/discussions/10470>

Osteoporosis Month November 2016 (October 24, 2016)

This post announces the start of Osteoporosis month in Canada. It notes that *“1 in 3 women and 1 in 5 men will experience an osteoporotic fracture in their lifetime resulting in a decreased quality of life and independence, fear of falling and an increased risk for institutionalization, hospitalization or death, along with contributing to the burden on the health care system.”*

<https://www.fallsloop.com/discussions/10444>

The role of OTs in fall prevention (November 4, 2015)

This discussion post on the role of Occupational Therapists (OTs) in fall prevention includes a number of scenarios to consider when conducting home safety assessments for older adults at moderate to high risk of falls. The post includes one sex-specific scenario *“Does a male client need to consider sitting down on the toilet instead of standing to address balance or strength limitations? Is he receptive to making that lifestyle change?”*

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