ORIGINAL RESEARCH

Demographic Comparisons of Self-Reported Fall Risk Factors Among Older Adults Attending Outpatient Rehabilitation

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Purpose: Identify the prevalence and prevalence differences of fall risk factors by sex, clinic rurality, and race/ethnicity among older adults (≥65 years old) receiving outpatient rehabilitation.

Patients and Methods: Our secondary analysis used Electronic Health Record data of 108,751 older adults attending outpatient rehabilitation (2018–2022) within a large health system across 7 states and completed the Stay Independent Questionnaire. The mean age was 73.3 (±6.36), 58.1% were female, 84.3% were non-Hispanic White, and 88.8% attended an urban clinic. Fall risks were identified via the Centers for Disease Control and Prevention's Stay Independent Questionnaire.

Results: Older adults had a high prevalence of fall risks (44.3%), including history of falls (34.9%). The most prevalent fall-risk factors were impaired strength, gait, and balance. Compared to males, females had a higher prevalence of reporting a fall (4.3%), a fall with injury (9.9%), worrying about falling 9.1%), rushing to the toilet (8.5%), trouble stepping onto a curb (8.4%), taking medicine for sleep or mood (6.0%), feeling sad or depressed (5.3%), and feeling unsteady (4.6%). Males reported a higher prevalence of losing feeling in feet (9.4%), ≥1 fall in the past year (8.1%), and using hands to stand up (4.4%). Compared to White older adults, Native American/Alaska Natives had the highest prevalence of fall history (43.8%), Hispanics had the highest prevalence of falls with injury (56.1%), and Hispanics and Blacks had a higher prevalence of reporting 11/12 Stay Independent Questionnaire risk factors.

Conclusion: Older adults receiving outpatient rehabilitation have a high prevalence of fall risks, including falls and difficulties with strength, balance, or gait. Findings indicate that rehabilitation providers should perform screenings for these impairments, including incontinence and medication among females, loss of feeling in the feet among males, and all Stay Independent Questionnaire -related fall risk factors among Native American/Alaska Natives, Hispanics, and Blacks.

Keywords: STEADI, injury prevention, geriatrics, physical therapy, health disparities, social determinants of health

Introduction

Among adults aged 65 and older in the United States (U.S.), falls are a leading cause of injury.[1] In 2018, fall-related injuries led to approximately 3 million emergency department visits, more than 950,000 hospitalizations, and approximately 32,000 deaths.[1] Based on US data from 2016 to 2018, inpatient and emergency department fall injuries cost an average of $19.8 billion dollars annually.[2] In addition to these fall-related injuries, 27.5% (n=13,685,662) of older adults reported having a non-injurious fall in 2018.[1] Based on global data between 1990 and 2017, falls result in 16,688,088 years of life lost, 19,252,699 years lived with

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disability, and 35,940,787 disability-adjusted life years.[3] Overall, falling is associated with disability, morbidity, and mortality, resulting in significant burden for older adults, clinicians, and healthcare systems.

The Centers for Disease Control (CDC), the American Geriatrics Society, the British Geriatrics Society, the Academy of Geriatric Physical Therapy of the American Physical Therapy Association, and the World Fall Prevention Guidelines highlight the need to prevent falls by screening, assessing, and providing targeted interventions for all individuals older than 65.[4–9] A tool for screening and assessing fall risk is the Stopping Elderly Accidents, Deaths, and Injuries (STEADI).[4] The CDC developed the STEADI initiative to promote the uptake of fall prevention by physicians in primary care.[4] The screening is initiated with either 3 key questions or the STEADI Stay Independent Questionnaire (SIQ), a 12-item self-report questionnaire for screening fall risk that includes the 3 key questions.[4] The questionnaire includes items about prior fall history, feeling unsteady, fear of falling, use of assistive devices, difficulty performing functional mobility, rushing to the bathroom, lack of sensation, fall risk increasing medications, and depression.[4] These SIQ items and additional assessments have been selected because they identify modifiable fall risk factors.[4] Those identified as having an increased risk of falling (SIQ $\geq$ 4) undergo additional gait, strength, balance and other modifiable fall risk assessments.[4] The STEADI screening has been successfully used in outpatient rehabilitation, with rehabilitation therapists (physical therapists, occupational therapists, and/or speech-language pathologists) completing SIQ screening on >50,000 older adults over a 4-year period (2018–2021).[10]

Results of a system-wide STEADI implementation study identified that 44.1% of older adults receiving outpatient rehabilitation services had a positive score on the SIQ scores, which is twice that of older adults identified as at risk for falling and being seen by a primary care provider.[11,12] Despite the high prevalence of older adults at increased risk of falling in outpatient rehabilitation, rehabilitation providers are not routinely screening or addressing older adults' fall risks. Just over 1 in every 10 (13.0%) Medicare beneficiaries at high risk of falling reported fall prevention being addressed during outpatient rehabilitation.[13] Claims data show that only 10.7% of older adults who had an upper extremity fracture had a fall risk assessment performed by a medical provider, and less than 1 in every 10 (6.0%) had an evaluation provided by a physical therapist.[14] This is an important finding secondary to the primary mechanism of upper extremity fractures experienced by older adults occurring status post falls.[14]

In order to address gaps in the literature identifying fall-risk factors among older adults attending outpatient rehabilitation, the present study has two aims. First, we investigate SIQ-specific fall risk and prevalence of fall risk factors among older adults receiving outpatient rehabilitation. Second, we investigate differences in older adults' fall risk and prevalence of fall risk factors by sex, clinic rurality, race, and ethnicity.[1]

Methods
Design
We extracted Electronic Health Record (EHR) data of older adults ($\geq$65 years old) who attended outpatient rehabilitation between January 2018 and December 2022 in clinics associated with a large health system in Alaska, California, Montana, New Mexico, Oregon, Texas, and Washington (N = 153,308). A retrospective implementation evaluation of the health system's STEADI integration in outpatient rehabilitation in Oregon can be found elsewhere.[10]

Ethical Considerations
The study was deemed exempt by the University of Arkansas for Medical Sciences Institutional Review Board (IRB #262879), category [4c] based on Title 45 CFR 46.101. The IRB granted a waiver of HIPAA authorization for protected health information and determined that the research cannot practicably be conducted without access to or use of the protected health information and cannot practicably be carried out without the waiver. The IRB determined that the research uses the following Methods to ensure minimal risk to privacy of subjects: A plan to protect the identifiers from improper use or Disclosure, a plan to destroy the identifiers at the earliest opportunity consistent with the conduct of research, unless there is a health or research justification for retaining the identifiers or retention is required by law, an assurance that the protected health information will not be re-used or disclosed to any other person or entity, except as required by law, for authorized oversight of the research project, or for other research as permitted by the HIPAA regulations.

Procedures

First, we reduced the data to older adults who had a complete SIQ, fall risk screening by a physical therapist, occupational therapist, or speech-language pathologist (N = 140,796). Second, we reduced the data to include only the first visit with a complete SIQ among all visits, as shown in Table 1 (77.2%, N = 108,751). Finally, we excluded those with a response of "unknown", "patient refused", "Don't know/Not sure" for our analyses. This resulted in a final working sample (N = 105,429).

Variables
Demographic Variables

Older adults attending outpatient rehabilitation self-reported their sex, race, and ethnicity when they were first registered for care in the integrated health system. Those data carry over to all other care within the health system. A total of 86 clinics across seven states served as the basis for this study. Clinic locations were designated as rural or urban by cross-referencing clinic zip codes in the Rural-Urban Commuting Area (RUCA) database, which is publicly available to download on a website hosted by the USDA Economic Research Service.[15] Codes 1–6, which include location types ranging from large metropolitan areas to small suburban areas, were designated as urban. The remaining codes (7–10), which include location types ranging from small towns to rural areas, were designated as rural. There were 17 clinics out of the 86 (19.8%) located in rural areas. A total of 5 of the 11 clinics in Alaska, 0 of the 18 in California, 2 of the 5 in Montana, 7 of the 23 in Oregon, 3 of the 26 in Washington, and 0 out of both the 3 in Texas and the 1 in New Mexico were in rural areas.

Outcome Variables

The SIQ is a 12-item self-report fall risk screening questionnaire with dichotomous responses ("Yes" or "No").[4] The first three questions on the SIQ are considered "Key Questions:" 1) *I have fallen the past year*; 2) *Sometimes I feel unsteady when I am walking*; and 3) *I am worried about falling*.[4] All "Yes" responses, except for two items, were scored as one point.[4] These two items were as follows: 1) *I have fallen in the past year*; and 2) *I use or have been advised to use a cane or walker to get around safely*.[4] A score of ≥4 indicates an increased risk of falling.[4] The SIQ scores were completed by adults ages 65 years and older who were seen at a clinic by physical therapists, occupational therapists, and/or speech-language pathologists.

Statistical Analysis

Descriptive statistics were estimated for the overall sample and by three predictor Variables –sex, rurality of clinic location, and race/ethnicity. Frequency and percent were reported for all categorical variables and mean and standard deviation were reported for age and SIQ score.

Predictive analyses were conducted via logistic regression and included estimating prevalence, prevalence differences, and prevalence ratios. Prevalence ratios (equivalent to relative risk ratios) were selected primarily because of their conservative nature, especially when compared to odds ratios,[16] but also because the data analyzed are cross-sectional.[17] Per STROBE recommendations,[18] and more recent calls for inclusion of both absolute measures (absolute prevalence/risk, absolute prevalence/risk difference) and relative measures (odds ratios, relative risk ratios, prevalence ratios, etc). We report all three measures to provide context for each other.[17,19] We present prevalence and prevalence differences in Tables 2–5, overall and by each predictor. Prevalence ratios are provided in Tables A, B, and C. Female, Urban, and White (the majority of the sample) were the reference categories in each of the three regression models where sex, clinic location, and race/ethnicity, respectively, were the predictor variable. Each of the regression models controlled for age.[1] Older adults with missing values or responses of "Unknown", "Don't know/Not sure", or "Refused" for race/ethnicity were excluded.

We employed the PROC GENMOD procedure to estimate prevalence, prevalence difference (invoking the identity link function), and prevalence ratios (invoking the log binomial function), which is the recommended method for estimation given the data.[20,21] All analyses were conducted using SAS/STAT v9.4,[22] and alpha was set at 0.05.

Table 1 Demographics, Overall SIQ Score, and Fall Risk – Overall Frequencies and Differences by Fall Status, Sex, Clinic Rurality, and Race/Ethnicity Among Adults Aged 65 and Older

Measure	12-Month Fall History (Q1)			Sex			Clinic Location			Race/Ethnicity									TOTAL
	No Falls[†]	≥ 1 Fall		Female	Male		Rural	Urban		AAI	ASN	BLK	HIS	NHP	OHR	UKN	WHT[††††]		TOTAL
	n (%)			n (%)			n (%)			n (%)									n (%)
Total N	70,770 (65.1)	37,981 (34.9)	***	68,524 (63.0)	40,227 (37.0)	***	12,573 (11.6)	96,178 (88.4)	***	597 (0.6)	4,466 (4.1)	1,801 (1.7)	4,410 (4.1)	292 (0.3)	2,237 (2.1)	3,322 (3.1)	91,626 (84.3)	***	108.,751 (100.0)
Age, *Mean (SD)*	73.3 (6.36)	75.2 (7.00)	***	73.8 (6.64)	74.0 (6.65)	***	73.7 (6.62)	74.0 (6.65)	***	73.1 (7.07)	73.9 (6.64)	72.8 (6.36)	73.1 (6.47)	72.0 (6.04)	73.5 (6.43)	73.0 (6.30)	74.0 (6.66)	***	74.0 (6.65)
At Risk for Falls (Yes)[††]	15,604 (22.1)	32,556 (85.7)	***	31,981 (46.7)	16,179 (40.2)	***	5,666 (45.1)	42,494 (44.2)		304 (50.9)	1,634 (36.6)	821 (45.6)	1,892 (42.9)	142 (48.6)	904 (40.4)	1,301 (39.2)	41,162 (44.9)	***	48,160 (44.3)
SIQ Score, *Mean (SD)[†††]*	1.65 (2.91)	7.68 (3.30)	***	3.96 (4.23)	3.41 (4.10)	***	3.83 (4.17)	3.75 (4.19)	**	4.63 (4.60)	3.08 (3.93)	3.97 (4.42)	3.73 (4.28)	4.33 (4.35)	3.47 (4.18)	3.21 (3.90)	3.81 (4.20)	***	3.76 (4.19)
Sex			***																
Female	43,585 (61.6)	24,939 (65.7)																	
Male	27,185 (38.4)	13,042 (32.2)																	
Clinic Location			***			***													
Rural	7,932 (11.2)	4,641 (12.2)		7,462 (10.9)	5,111 (12.7)														
Urban	62,838 (88.8)	33,340 (87.8)		61,062 (89.1)	35,116 (87.3)														
Race/Ethnicity			***			***			***										
AAI	341 (0.5)	256 (0.7)		392(0.6)	205 (0.5)		137 (0.6)	460 (0.5)											
ASN	3,327 (4.7)	1,139 (3.0)		3,098 (4.5)	1,368 (3.4)		113 (4.5)	4,353 (3.4)											

BLK	1,228 (1.7)	573 (1.5)		1,169 (1.7)	632 (1.6)		25 (1.7)	1,776 (1.6)								
HIS	2,926 (4.1)	1,484 (3.9)		2,946 (4.3)	1,464 (3.6)		302 (4.3)	4,108 (3.6)								
NHP	189 (0.3)	103 (0.3)		174(0.3)	118 (0.3)		14 (0.3)	278 (0.3)								
OHR	1,566 (2.2)	671 (1.8)		1,356 (2.0)	881 (2.2)		157 (2)	2,080 (2.2)								
UKN	2,272 (3.2)	1,050 (2.8)		1,949 (2.8)	1,373 (3.4)		390 (2.8)	2.932 (3.4)								
WHT	58,921 (83.3)	32,705 (86.1)		57,440 (83.8)	34,186 (85.9)		11,435 (91.0)	80,191 (83.4)								

Notes: Adults with an unknown race are included in this analysis; [†]"No falls" is the reference group. [††]At Risk is based on Stay Independent Questionnaire (SIQ) ≥ 4. [†††]An *SIQ Score* was designated complete by meeting one of the following two criteria:-All three SIQ screener responses were complete (Q1, Q2, Q3) and their sum was 0, with no missing values, and there were no responses to Q4-12 or -All three SIQ screener responses were complete, their sum was greater than 0, and all 12 SIQ questions had a non-missing response. [††††]White is the reference group. **p<0.01 ***p<0.001 denotes a significant difference; alpha=0.05.
Abbreviations: AAI, Native American, Alaska Native; ASN, Asian; BLK, Black; HIS, Hispanic; NHP, Native Hawaiian, Pacific Islander; OHR, Other; UKN, Unknown, WHT, White.

Table 2 Prevalence and Prevalence Difference of Affirmative SIQ Responses by Fall History Among Adults Aged 65 and Older, Controlling for Age

Outcomes	Prevalence Self-Reported 12-Month Fall History (Q1)		Prevalence Difference
	No Falls[†]	Falls	95% CI
At risk for falls (SIQ ≥ 4)[††]	22.2	83.3	61.1 (60.6, 61.6)***
SIQ item (responding "Yes")[†††]			
Q2. Feel unsteady	26.5	68.4	41.9 (41.3, 42.5)***
Q3. Worried about falling	20.7	61.8	41.1 (40.6, 41.7)***
Q4. Use or advised to use cane or walker	41.9	49.0	7.1 (6.3, 7.9)***
Q5. Steady self on furniture	48.8	51.9	3.1 (2.3, 4.0)***
Q6. Need to use hands to stand up from chair	65.6	65.7	−0.09(−0.9, 0.6)
Q7. Trouble stepping up onto curb	50.7	52.0	1.3 (0.5, 2.1)**
Q8. Often need to rush to toilet	37.9	42.0	4.2 (3.3, 5.0)***
Q9. Lost feeling in feet	33.7	35.7	2.1 (1.3, 2.9)***
Q10. Takes medicine causing light-headedness or tiredness	23.9	25.8	1.9 (1.2, 2.6)***
Q11. Takes medicine for sleep or mood	33.8	38.9	5.1 (4.3, 5.9)***
Q12. Often feel sad or depressed	20.0	25.6	5.6 (4.9, 6.3)***

Notes: Adults with an unknown race are excluded from this analysis. Prevalence difference scores may not equal the calculated raw difference between the two prevalence values due to rounding. [†]"No falls" is the reference group. [††]At Risk is based on Stay Independent Questionnaire (SIQ) ≥ 4. [†††]An *SIQ Score* was designated complete by meeting one of the following two criteria:-All three SIQ screener responses were complete (Q1, Q2, Q3) and their sum was 0, with no missing values, and there were no responses to Q4-12 or -All three SIQ screener responses were complete, their sum was greater than 0, and all 12 SIQ questions had a non-missing response. **$p<0.01$ ***$p<0.001$ denotes significance level of Prevalence Difference; alpha=0.05.
Abbreviation: CI, Confidence Interval.

Table 3 Prevalence and Prevalence Differences of Affirmative SIQ Responses by Sex Among Adults Aged 65 and Older, Controlling for Age

Outcomes	Prevalence		Prevalence Difference (95% CI)
	Female[†]	Male	
At risk for falls (SIQ ≥4) (Yes)[††]	46.8	40.1	−6.7 (−7.3, −6.1)***
SIQ item (responding "Yes")[†††]			
Q1. Fall in the last year	36.5	32.2	−4.3 (−4.9, −3.8)***
Q1a. >1 fall in last year	50.1	58.2	8.1 (7.0, 9.2)***
Q1b. Fall with injury	55.4	45.5	−9.9 (−11.0, −8.9)***
Q2. Feel unsteady	43.2	38.5	−4.6 (−5.2, −4.1)***
Q3. Worried about falling	38.6	29.5	−9.1 (−9.6, −8.5)***
Q4. Use or advised to use cane or walker	45.9	47.5	1.6 (0.7, 2.4)***
Q5. Steady self on furniture	50.4	51.5	1.1 (0.2, 1.9)*
Q6. Need to use hands to stand up from chair	64.2	68.6	4.4 (3.6, 5.2)***
Q7. Trouble stepping up onto curb	54.4	46.0	−8.4 (−9.3, −7.6)***
Q8. Often need to rush to toilet	43.4	34.9	−8.5 (−9.3, −7.7)***
Q9. Lost feeling in feet	31.8	41.2	9.4 (8.6, 10.2)***
Q10. Takes medicine causing light-headedness or tiredness	24.8	25.6	0.8 (0.02, 1.5)
Q11. Takes medicine for sleep or mood	39.1	33.1	−6.0 (−6.8, −5.2)***
Q12. Often feel sad or depressed	25.4	20.1	−5.3 (−6.0, −4.6)***

Notes: Adults with an unknown race are excluded from this analysis. Prevalence difference scores may not equal the calculated raw difference between the two prevalence values due to rounding. [†]Female is the reference group. [††]At Risk is based on Stay Independent Questionnaire SIQ ≥ 4. [†††]A *SIQ Score* was considered complete, and designated by meeting one of the following two criteria:-All three SIQ screener responses were complete (Q1, Q2, Q3) and their sum was 0, with no missing values, and there were no responses to Q4-12 or-All three SIQ screener responses were complete, their sum was greater than 0, and all 12 SIQ questions had a non-missing response. *$p<0.05$ ***$p<0.001$ denotes significance level of Prevalence Difference; alpha=0.05.
Abbreviation: CI, Confidence Interval.

Table 4 Prevalence and Prevalence Differences of Affirmative SIQ Responses by Rurality Among Adults Aged 65 and Older, Controlling for Age

Outcomes	Prevalence		Prevalence Difference (95% CI)
	Rural	Urban[†]	
At risk for falls (SIQ ≥4) (Yes)[††]	45.5	44.2	1.3 (0.4, 2.2)**
STEADI question (responding "Yes")[†††]			
Q1. Fall in last year	37.1	34.7	2.5 (1.6, 3.3)***
Q1a. >1 fall in last year	53.0	52.9	0.2 (−1.4, 1.7)
Q1b. Fall with injury	52.3	51.9	0.4 (−1.1, 2.0)
Q2. Feel unsteady	42.6	41.3	1.3 (0.4, 2.2)**
Q3. Worried about falling	35.0	35.3	−0.2 (−1.1, 0.6)
Q4. Use or advised to use cane or walker	44.7	46.7	2.0 (0.8, 3.2)**
Q5. Steady self on furniture	50.4	50.9	−0.5 (−1.7, 0.8)
Q6. Need to use hands to stand up from chair	66.2	65.6	0.6 (−0.5, 1.8)
Q7. Trouble stepping up onto curb	50.8	51.6	−0.8 (−2.0, 4.5)
Q8. Often need to rush to toilet	38.9	40.8	−1.9 (−3.1, −0.7)**
Q9. Lost feeling in feet	35.1	35.0	0.2 (−1.0, 1.4)
Q10. Takes medicine causing light-headedness or tiredness	24.8	25.1	−0.4 (−1.4, 0.7)
Q11. Takes medicine for sleep or mood	37.0	37.1	−0.03 (−1.2, 1.2)
Q12. Often feel sad or depressed	22.0	23.8	−1.8 (−2.8, 0.8)***

Notes: Adults with an unknown race are excluded from this analysis. Prevalence difference scores may not equal the calculated raw difference between the two prevalence values due to rounding. [†]Urban is the reference group. [††]At Risk is based on Stay Independent Questionnaire SIQ ≥ 4. [†††]A *SIQ Score* was considered complete, and designated by meeting one of the following two criteria:-All three SIQ screener responses were complete (Q1, Q2, Q3) and their sum was 0, with no missing values, and there were no responses to Q4-12 or-All three SIQ screener responses were complete, their sum was greater than 0, and all 12 SIQ questions had a non-missing response. **p<0.01 ***p<0.001 denotes significance level of Prevalence Difference; alpha=0.05.
Abbreviation: CI, Confidence Interval.

Results

The mean age of older adults receiving outpatient rehabilitation therapy services between 2018 and 2022 was 74.0 (SD = 6.65). They primarily visited a clinic located in an urban setting (n = 62,838; 88.8%), were non-Hispanic White (n = 91,626; 84.3%) and were female (n = 68,524; 63.0%). See Table 1. Among the 108,751 older adults, the three most prevalent SIQ fall risk factors were 1) need to use hands to stand up from chair; 2) trouble stepping up on to a curb; and 3) steady self on furniture. Approximately 35% of older adults reported one or more falls in the past year and 44.3% were at-risk for falling based on the SIQ score. Except for rural and urban clinic location and fall risk, there were significant differences in all demographic variables by age, history of falls, clinic location, and race/ethnicity. Details are discussed in the analyses below.

Comparison of Fall Risk Factor Prevalence Based on Fall Status

Older adults with a history of one or more falls in the past 12 months had a higher mean age (73.3 vs 75.2) than those with no falls (Table 1). The three most prevalent fall risk factors reported among older adults with a fall history attending outpatient physical therapy were as follows: 1) feel unsteady (68.4% vs 26.5%); worried about falling (61.8% vs 20.7%); and 3) steady self on furniture (51.9% vs 48.8%). See Table 2.

All but one (the need to use hands to stand up from chair) of the prevalence differences among risk factors were significantly greater. Older adults with a self-reported history of falls had a 41.9% greater prevalence difference of feeling unsteady and worry about falling compared to older adults without a history of falls. See Table 2 for additional differences between older adults with and without a fall history in the past 12 months.

Comparison of Fall Risk Factor Prevalence Based on Sex

Females had a higher mean overall SIQ score (3.96 vs 3.41) and a higher prevalence of being identified as at-risk for falls (46.8% vs 40.1%) compared to men (Table 3). The three most prevalent fall risk factors reported among females were as follows: 1) need to use hands to stand up from chair (64.2%); 2) fall with injury (55.4%); and 3) trouble stepping up onto

Table 5 Prevalence and Prevalence Differences in Affirmative SIQ Responses by Race/Ethnicity Among Adults Aged 65 and Older, Controlling for Age

Outcomes	Prevalence Prevalence Difference (95% CI)						
	WHT[†]	AAI	ASN	BLK	HIS	NHP	OHR
At risk for falls (SIQ ≥4) (Yes)[††]	44.8	51.3***	36.8***	47.6*	44.6	52.3*	41.4***
		7.0 (3.3, 10.7)	-8.0 (−9.4, −6.6)	2.7 (0.5, 5.0)	−0.3 (−1.7, 1.2)	7.4 (1.7, 13.2)	-3.5 (−5.4, −1.5)
SIQ question (responding "Yes")[†††]							
Q1. Fall in last year	35.6	43.8***	25.5***	33.2***	34.6	37.1	30.6***
		8.2 (4.3, 12.1)	-10.1 (−11.1, −8.3)	-2.4 (−4.6, −0.3)	−1.0 (−2.4, 0.04)	1.5 (−4.0, 6.9)	-5.0 (−6.9, −3.1)
Q1a. >1 fall in last year	53.6	55.9	41.5***	51.5	47.0***	59.7	55.5
		2.3 (−3.9, 8.5)	-12.1 (−15.1, −9.1)	−0.02 (−6.4, 2.1)	-6.7 (−9.3, −4.0)	6.1 (−3.8, 16.1)	1.9 (−2.0, 5.8)
Q1b. Fall with injury	51.9	53.5	53.7	45.3**	56.1**	42.6	51.9
		1.6 (−4.5, 7.7)	2.0 (−0.9, 5.0)	-6.5 (−10.7, −2.4)	4.3 (1.7, 6.9)	−9.3 (−19.1, 0.5)	−0.9 (−4.7, 2.9)
Q2. Feel unsteady	42.0	48.0***	34.9***	44.6***	40.1**	53.4***	37.2***
		6.0 (2.3, 9.7)	-7.1 (−8.5, −5.7)	2.6 (0.3, 4.8)	−1.9 (−3.3, −0.5)	11.4 (5.7, 17.2)	-4.8 (−6.7, −2.9)
Q3. Worried about falling	35.1	41.3**	35.9	35.5	38.9***	49.2***	35.2
		6.2 (2.4, 99.5)	0.7 (−0.7, 2.1)	0.3 (−1.8, 2.4)	3.7 (2.3, 5.1)	14.0 (8.4, 19.7)	0.08 (−1.9, 1.9)
Q4. Use or advised to use cane or walker	45.8	59.8***	46.7	64.3***	53.8***	53.0	49.2*
		14.0 (9.3, 18.7)	0.01 (−1.2, 3.1)	18.5 (15.6, 21.5)	8.1 (6.0, 10.1)	7.3 (0.0, 14.6)	3.4 (0.6, 6.3)
Q5. Steady self on furniture	50.5	57.3**	50.0	58.1***	55.8***	60.3	56.1***
		6.8 (1.8, 11.8)	−0.5 (−2.1, 2.5)	7.6 (4.5, 10.7)	5.3 (3.3, 7.4)	9.9 (2.6, 17.1)	5.6 (2.7, 8.5)
Q6. Need to use hands to stand up from chair	65.5	71.4*	62.2**	76.5***	70.4***	70.0	66.5
		6.0 (1.4, 10.5)	-3.3 (−5.4, −1.2)	11.0 (8.4, 13.6)	4.9 (3.0, 6.8)	4.6 (−2.4, 11.6)	1.0 (−1.8, 3.8)
Q7. Trouble stepping up onto curb	50.7	59.7***	55.3***	63.0***	60.6***	59.6*	55.7***
		9.0 (4.0, 14.1)	4.6 (2.5, 6.8)	12.3 (9.2, 15.4)	9.9 (7.9, 12.0)	8.9 (1.6, 16.1)	5.0 (2.0, 7.9)
Q8. Often need to rush to toilet	40.8	45.5	36.1***	48.9***	38.1**	38.7	41.7
		4.7 (−0.3, 9.8)	-4.6 (−6.7, −2.6)	8.2 (5.0, 11.4)	-2.7 (−4.7, −0.7)	−2.1 (−9.2, 5.0)	0.9 (−2.0, 3.8)
Q9. Lost feeling in feet	35.5	40.9*	27.6***	37.8	32.2***	38.7	33.6
		5.4 (0.3, 10.5)	-7.9 (−10.0, −5.9)	2.3 (−0.8, 5.4)	-3.3 (−5.3, −1.4)	3.2 (−4.0, 10.3)	−1.9 (−4.7, 0.9)
Q10. Takes medicine causing light-headedness or tiredness	25.1	27.2	22.2**	28.3*	25.6	28.6	26.7
		2.0 (−2.6, 6.7)	-3.0 (−4.8, −1.2)	3.1 (0.2, 6.0)	0.5 (−1.3, 2.3)	3.4 (−3.2, 10.1)	1.6 (−1.1, 4.2)
Q11. Takes medicine for sleep or mood	38.5	35.7	22.6***	27.3***	28.3***	26.9***	32.2***
		−2.8 (−7.8, 2.1)	-15.9 (−17.7, −14.2)	-11.3 (−14.1, −8.4)	-10.3 (−12.1, −8.4)	-11.6 (−18.0, −5.1)	-6.3 (−9.0, −3.5)
Q12. Often feel sad or depressed	23.6	29.5*	22.9	25.5	29.3***	18.1	29.6***
		6.3 (1.5, 11.0)	−0.4 (−2.2, 1.5)	2.3 (−0.5, 5.1)	6.0 (4.1, 7.9)	−5.2 (−10.8, 0.5)	6.3 (3.6, 9.0)

Notes: Adults with an unknown race are excluded from this analysis. Prevalence difference scores may not equal the calculated raw difference between the two prevalence values due to rounding. [†]White is the reference group. [††]At Risk is based on Stay Independent Questionnaire SIQ ≥ 4. [†††]A *SIQ Score* was considered complete and designated by meeting one of the following two criteria:-All three SIQ screener responses were complete (Q1, Q2, Q3) and their sum was 0, with no missing values, and there were no responses to Q4-12 or -All three SIQ screener responses were complete, their sum was greater than 0, and all 12 SIQ questions had a non-missing response. *p<0.05 **p<0.01 ***p<0.001 denotes significance level of Prevalence Difference; alpha=0.05.
AI, Native American, Alaska Native; ASN, Asian; BLK, Black; HIS, Hispanic; NHP, Native Hawaiian, Pacific Islander; OHR, Other; WHT, White; CI, confidence interval.

the curb (54.4%). The three most prevalent fall risk factors reported among males were as follows: 1) need to use hands to stand up from chair (68.6%); 2) >1 fall in last year (58.2%); and 3) steady self on furniture (51.5%). When examining prevalence differences, females had a 9.9% higher prevalence of reporting a fall with injury; 9.1% higher prevalence of reporting being worried about falling; 8.5% higher prevalence of reporting that they often need to rush to the toilet; 8.4% higher prevalence of reporting trouble stepping up onto curb; 6.0% higher prevalence of reporting taking medicine for sleep or mood; 5.3% higher prevalence of reporting that they often feel sad or depressed; 4.6% higher prevalence of reporting that they feel unsteady; and 4.3% higher prevalence of a fall in the last year.

Conversely, males had a 9.4% higher prevalence of reporting lost feeling in feet; 8.1% prevalence of reporting >1 fall in last year; 4.4% higher prevalence of reporting the need to use hands to stand up from chair; 1.6% higher prevalence of reporting that they use or are advised to use a cane or walker; and 1.1% higher prevalence of reporting the need to steady self on furniture. See Table 3 for additional detail about differences between females and males.

Comparison of Fall Risk Factor Prevalence Based on Clinic Rurality

Older adults seeking care at a rural clinic had a higher average STEADI Score (3.84 vs 3.75). See Table 1 for differences in demographic variables. The three most prevalent fall risk factors reported by older adults seeking care at rural versus urban clinics were the same: 1) need to use hands to stand up from chair (66.2% and 65.6%); 2) >1 fall in the last year (53.0% and 52.9%); and 3) fall with injury (52.3% and 51.9%). The prevalence differences between those who receive care in a rural versus urban clinic were small (≤2.5%) and only significant for fall history, feeling unsteady, use or advised to use cane or walker, need to rush to toilet, and often feeling sad or depressed. See Table 4 for additional detail about differences between those who receive care in rural versus urban clinics.

Comparison of Fall Risk Factor Prevalence Based on Race and Ethnicity

Based on race and ethnicity, the overall SIQ scores in descending order from highest to lowest were identified among: 1) Native American, Alaska Native (4.6); 2) Native Hawaiian, Pacific Islander (4.4); 3) Black (4.0); 4) White (3.8); 5) Hispanic (3.7), and 6) Asian (3.1). See Table 5 for differences in demographic variables.

The three most prevalent risk factors reported by older adults who self-identify as Native American and Alaska Native were as follows: 1) need to use hands to stand up from chair (71.4%); 2) trouble stepping up onto curb (59.7%); and 3) use or advised to use cane or walker (59.8%).

The three most prevalent risk factors reported by older adults who self-identify Native Hawaiian, Pacific Islander: 1) need to use hands to stand up from chair (70.0%); 2) steady self on furniture (60.3%); and 3) >1 fall in the last year (59.7%).

The three most prevalent risk factors reported by older adults who self-identify as Black were as follows: 1) need to use hands to stand up from chair (76.5%); 2) use or advised to use a cane or walker (64.3%); and 3) trouble stepping up onto curb (63.0%).

The three most prevalent risk factors reported by older adults who self-identify as White were as follows: 1) need to use hands to stand up from chairs (65.5%); 2) >1 fall in last year (53.6%); and 3) fall with injury (51.9%).

The three most prevalent risk factors reported by older adults who self-identify as Asian or Hispanic were the same: 1) need to use hands to stand up from chair (62.2% and 70.4%, respectively); 2) trouble stepping up onto curb (55.3% and 60.6%, respectively); and 3) fall with injury (53.7% and 56.1%, respectively). Prevalence differences by race were calculated using older adults self-identifying as White as the reference group. All prevalence differences by race that follow reflect this comparison.

Native American, Alaska Native older adults had a 14.0% higher prevalence of reporting that they use or were advised to use a cane or walker; 9.0% higher prevalence of reporting trouble stepping up onto a curb; 8.2% higher prevalence of reporting a fall in the last year; 6.8% higher prevalence of reporting the need to steady self on furniture; 6.3% higher prevalence of reporting that they often feel sad or depressed; 6.2% higher prevalence of reporting being worried about falling; 6.0% higher prevalence of reporting that they feel unsteady; 6.0% higher prevalence of reporting that they need to use hands to stand up from chair; and 5.4% higher prevalence of reporting a lost feeling in feet.

Native Hawaiian and Pacific Islander older adults had a 14.0% higher prevalence of reporting being worried about falling; 11.4% higher prevalence of reporting that they feel unsteady; 9.9% higher prevalence of reporting the need to steady self on furniture; and 8.9% higher prevalence of reporting trouble stepping up onto curb. They also had a 11.6% lower prevalence of reporting the need to take medicines for sleep or mood.

Black older adults had an 18.5% higher prevalence of reporting the need or advised to use a cane or walker; 12.3% higher prevalence of reporting trouble stepping up onto a curb; 11.0% higher prevalence of reporting the need to use hands to stand up from chair; 8.2% higher prevalence of reporting that they need to rush to the toilet often; 7.6% higher prevalence of reporting the need to steady self on furniture; and 3.1% higher prevalences of reporting that they take medicine causing light-headiness or tiredness. They also had a 11.3% lower prevalence of reporting that they take medicine for sleep or mood; 6.5% lower prevalence of reporting a fall with injury; and 2.4% lower prevalence of reporting a fall in last year.

Hispanic older adults had a 9.9% higher prevalence of reporting trouble stepping up onto curb; 8.1% higher prevalence of reporting the use or advised to use cane or walker; 6.0% higher prevalence of reporting that they often feel sad or depressed; 5.3% higher prevalence of reporting the need to steady self on furniture; 4.9% higher prevalence of reporting the need to use hands to stand up from chair; and 4.3% higher prevalence of reporting a fall with injury. They also had a 10.3% lower prevalence of reporting that they take medication for sleep or mood; 6.7% lower prevalence of reporting >1 fall in the last year; 3.3% lower prevalence of reporting that they lost feeling in feed; 2.7% lower prevalence of reporting that they often need to rush to toilet; and 1.9% lower prevalence of reporting that they feel unsteady. Asian older adults had a 4.6% higher prevalence of reporting trouble stepping onto a curb; a 15.9% lower prevalence of reporting that they take medicine for sleep or mood; 12.1% lower prevalence of reporting >1 fall in the last year; 10.1% lower prevalence of reporting a fall in the last year; 7.9% lower prevalence of reporting that they lost feeling in feet; a 7.1% lower prevalence of reporting that they feel unsteady; 4.6% lower prevalence that they often need to rush to toilet; and 3.3% lower prevalence that they need to use hands to stand up from chair. See Table 5 for additional details about fall-risk prevalence differences between older adults who self-identify as Native American, Alaska Native, Asian, Black, Hispanic, Native Hawaiian, Pacific Islander, and White.

Discussion
Fall Risk Among Older Adults Attending Outpatient Rehabilitation

This is the first study to identify self-reported falls, ascertain the prevalence of fall risk factors, and compare demographic differences in their prevalence among older adults attending outpatient rehabilitation. Among the 108,751 older adults receiving outpatient rehabilitation, 34.9% reported having a fall in the last year and 44.3% were at risk for falling based on their STEADI SIQ score. These fall-risk rates are two times higher than studies implementing STEADI in primary care, where between 18% and 22% of older adults were screened at risk for falls based on SIQ.[11,23] Risk factors with the highest prevalence were feeling unsteady, needing hands to stand up from a chair, worrying about falling, and trouble stepping up on to a curb. A self-reported history of falls, feeling unsteady, and worrying about falling align with the three key questions STEADI screening promoted by the CDC.[24] Secondary to older adults with difficulty performing functional abilities reporting more falls than those without difficulties,[1] and our findings related to the prevalence of risk factors associated with falls, the following two risk factors should be considered as important SIQ items among older adults attending outpatient rehabilitation: 1) needing hands to stand up from chair and 2) difficulty stepping up onto a curb.

The highest prevalence risk factors in our study of older adults attending outpatient rehabilitation are related to balance, gait, and strength. Considering that older adults often seek rehabilitation care related to these same three risk factors, it is not surprising that our prevalence of reported falls in the past year was also higher than the national average.[13] Similarly, Gellet al identified that 63.9% of older adults at increased fall-risk reported receiving rehabilitation services, and higher fall risk was associated with greater use of rehabilitation services.[13] Despite older adults at increased risk of falling reporting greater rehabilitation services, only 26% of physical therapists utilize a multifactorial screening tool such as the STEADI.[25] The prevalence of high fall risk and physically modifiable risk factors among older adults

attending outpatient rehabilitation highlights the importance of all older adults being screened for falls and receiving interventions for modifiable fall risk factors.

Fall Risk and Clinic Rurality

We found a 2.5% significant difference in fall rate among older adults attending an outpatient rehabilitation clinic in a rural setting compared to an urban setting. Although unequal sample sizes may have impacted our results, other large studies in the US have found small but significantly higher self-reported falls among older adults in rural versus urban locations.[1,26]

Fall Risk and Sex

The sex-specific results about falls and fall risk factors partially align with previous literature. For example, compared to males, more female participants reported having a fall and being injured from a fall in the last year. This trend among females aligns with a recent study of the Behavioral Risk Factor Surveillance System on fatal and nonfatal falls and related injuries among older adults in the US between 2012 and 2018.[1] However, both sexes in our study had a higher prevalence of falls and fall-related injuries compared to previous research. The starkest differences in prevalence were in fall-related injuries. We found that 55.4% of females and 45.5% of males reported a fall-related injury compared to Moreland's findings of 11.9% for females and 7.9% for males. While our samples are different, our data highlight the need of rehabilitation providers to screen older adults for a history of fall-related injury.

Regarding sex-specific fall risk factors, we found that females had a higher prevalence of reporting the need to rush to the toilet and trouble stepping up onto a curb (a sign of frailty).[27] Gale et al also identified that among females, the risk factors with the greatest odds ratio (OR) were incontinence (OR = 1.48) and frailty (OR = 1.69). The findings about incontinence and prevalence of falling being higher among females are supported by other studies focusing on frailty, sarcopenia, and incontinence.[28,29] The findings highlight the importance of screening for incontinence among females attending outpatient physical therapy. We found that males had a higher prevalence of reporting lost feeling in feet, more than one fall in the last year, and needing to use hands to stand up from a chair. Our findings of higher prevalence of loss of feeling in feet among males align with previous literature identifying that males have approximately twice the prevalence of peripheral neuropathy compared to females.[30] These data highlight the importance of rehabilitation providers assessing sensation in older males as a high prevalence fall risk factor.

Fall Risk and Race/Ethnicity

Fall risk based on SIQ score was highest among Native American/Alaska Native, and lowest among Asian older adults. We also found that Native American/Alaska Natives had the highest self-reported history of falls in the past year, which aligns with the literature.[1] Conversely, our findings that Hispanic older adults reported the highest prevalence of falls with injuries do not align with the literature, which indicates that Native American/Alaskan Natives have the highest prevalence of falls with injuries.[1]

Our findings regarding Asian and Black older adults reporting fewer falls and multiple falls align with previous literature.[31–33] Similar to others, we found older adults who identified as Black had a greater prevalence of reporting balance and mobility-related difficulties.[34] These findings highlight that physical therapists need to ask about an older adult's history of falls but also ask about and assess balance and mobility difficulties. Regarding self-reported rushing to the bathroom, the only older adults that had an increased prevalence compared to Whites were those who self-identified as Black. These findings do not align with previous literature that found non-Hispanic White and Hispanic individuals have a higher prevalence of urinary incontinence.[35,36] Our finding that Native Americans, Alaska Natives had an increased prevalence of reporting losing feeling in their feet also does not align with previous literature, which identified that neuropathy is more prevalent among Blacks.[30,37] Blacks have a higher chronic disease count than non-Hispanic white respondents (IRR = 1.28).[38] The neuropathy and chronic disease count could account for the increased prevalence of Blacks taking medications that cause light-headedness or tiredness.[39] When it comes to feeling sad or depressed, compared to non-Hispanic Whites, minority populations are less likely to experience acute episodes of depression, but more likely to suffer from prolonged, chronic, and severely debilitating depression with heavy consequences on their

level of daily functioning, which did not align with our data.[40] Among older adults who self-identified as Hispanic or Black, we observed a higher prevalence of reporting 11 out of 12 risk factors listed on the SIQ. These results emphasize the importance of considering the association between race/ethnicity and the prevalence of risk factors when treating older adults and increasing focus on multifactorial screenings and assessments among individuals who self-identify as Black or Hispanic.

Limitations

We have multiple study limitations. First, we used secondary data extracted from EHR. Several variables that we would like to include and use to adjust our analyses were not available. For example, physical therapy utilization varies based on numerous social determinants of health. A systematic review found that females, non-Hispanic White individuals, and people who are employed, have a high socioeconomic status, have access to transportation, and live in an urban environment have a higher likelihood of utilizing physical therapy.[41] Unfortunately, these and other variables were not available for our secondary analyses, resulting in the inability to adjust our results based on income, education, employment, past medical history, and medications.

Second, our sample is quite unique, and thus less generalizable, as it is comprised of select older adults from Alaska, California, Montana, New Mexico, Oregon, Texas, and Washington. In addition to the race and ethnicity composition of our sample is under representative of Non-Hispanic Black older adults.[42]

Third, we also acknowledge the additional value of incorporating the three objective outcome measures used in the STEADI (timed up and go test, 30-second chair stand, and 4-stage balance test), particularly since we do not have information about our participants cognitive status and there may be recall bias in self-report. However, the three objective measures used in the STEADI were not consistently collected and thus, we were unable to use them for our analyses.

Despite these limitations, this is the first study that examines the prevalence of fall risk factors among older adults attending outpatient physical therapy. A major strength of this study is the use of EHR, which provides a greater representation of individuals seeking physical therapy services, leading to increased generalizability of our results. It also provides additional data about races/ethnicities that are often underrepresented in research. The differences we identified based on race/ethnicity and sex highlight the importance of considering demographics along with fall risk factors to create individualized assessments and interventions. Finally, our use of standardized fall risk screening tools contributes to the increased applicability of our results to clinical practice.

Conclusion

Our findings have multiple clinical implications. First, we found that older adults receiving outpatient rehabilitation are at increased risk of reporting a fall and at increased risk for falls compared to previous publications about community dwelling older adults. Second, we found self-reported difficulties in mobility and balance are highly prevalent among older adults attending outpatient rehabilitation, even if the reason is not related to falls or fall risk. Third, we found differences in risk factor prevalences based on sex and race/ethnicity. For example, when considering sex, among males it is critical to screen for a loss of sensation in feet and for females it is important to consider prevalence of frailty-related risk factors and incontinence. Considering race/ethnicity, it is essential to perform a multifactorial screening among individuals who are Native American, Alaska Native, Black, or Hispanic. The specifics of how to account for these differences require follow-up studies that can account for environmental and social factors.

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Disclosure

The authors report no conflicts of interest in this work.

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