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EMPIRICAL RESEARCH QUANTITATIVE

Perceived balance and self-reported falls: A retrospective cross-sectional study using the National Health and Aging Trend Study

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Abstract

Aims: To examine how perceived balance problems are associated with self-reported falls in the past month after controlling for known correlates of falls among older adults.

Background: Approximately 30% of adults age 65 and older fall each year. Most accidental falls are preventable, and older adults' engagement in fall prevention is imperative. Limited research suggest that older adults do not use the term 'fall risk' to describe their risk for falls. Instead, they commonly use the term 'balance problems'. Yet, commonly used fall risk assessment tools in both primary and acute care do not assess older adults' perceived balance.

Design and Method: The Health Belief Model and the concept of perceived susceptibility served as the theoretical framework. A retrospective, cross-sectional secondary analysis using data from the National Health and Aging Trends Study from year 2015 was conducted. The outcome variable was self-reported falls in the last month.

Results: A subsample of independently living participants ($N = 7499$) was selected, and 10.3% of the sample reported a fall. Multiple logistic regression analysis revealed that the odds of reporting a fall in the past month was 3.4 times ($p < .001$) greater for participants who self-reported having a balance problem compared to those who did not. In contrast, fear of falling and perceived memory problems were not uniquely associated with falls. Using a mobility device, reporting pain, poor self-rated health status, depression and anxiety scores were also associated with falling.

Conclusion and Implications: Older adults' perceived balance problem is strongly associated with their fall risk. Perceived balance may be important to discuss with older adults to increase identification of fall risk. Older adults' perceived balance should be included in nursing fall risk assessments and fall prevention interventions. A focus on balance may increase older adults' engagement in fall prevention.

KEYWORDS
accidental falls, balance, fear of falling, gerontology, Health Belief Model, older adults

1 | BACKGROUND

Accidental falls is a common yet serious health threat among older adults, and approximately 30% of adults age 65 and older suffer one or more falls each year (Bergen et al., 2016). Common risk factors for falls in older adults include mobility and gait problems, socio-demographics, medical diagnoses such as Parkinson disease and stroke, polypharmacy, sensory impairments, acute illness and history of falls (Deandrea et al., 2010). Older adults are especially vulnerable to the consequences of accidental falls, which include injuries (i.e. fractures and head traumas), decreased mobility and institutionalization, and increased mortality (Oliver et al., 2010) and falls are the leading cause of injury and injury death among this population (Bergen et al., 2016).

Among community-dwelling older adults, self-report is the primary method of identifying accidental falls and fall-related injuries. However, up to 72% of Medicare beneficiaries do not report falls or fall-related injuries to their healthcare providers (Hoffman et al., 2018). Moreover, older adults at risk for falling may not be enrolled in fall prevention interventions due to lack of self-reporting of accidental falls. Limited research suggests that older adults are disinclined to discuss the topic of falls with their healthcare providers (Dollard et al., 2014), because the topic is commonly associated with embarrassment, as being at risk for falling can imply weakness, dependency and frailty (Dolan & Taylor-Piliae, 2020). It is well established that health beliefs guide preventable health behaviour (Brewer et al., 2007; Rosenstock, 1974), and older adults' individual engagement in fall prevention is imperative to decrease falls among this population. Thus, it is important for nurses and other healthcare providers to understand older adults' health beliefs and perceptions of their own fall risk, which may lead to improved communication about the topic of falls and increase older adults' self-report of falls.

Findings from a recent phenomenological nursing study showed that the older adult participants did not use the term 'fall risk' to describe their own perceived risk for falling. Instead, they used the term 'having a balance problem' (Dolan, Rishel, et al., 2022). In addition, although the nine older adults in the study ($N=9$) all believed that they could fall if they did not manage their balance problem, only four of the participants reported having fear of falling (FOF) (Dolan & Pool, 2023; Dolan, Rishel, et al., 2022). Both community-dwelling and hospitalized older adults' perceived fall risk has been studied (Delbaere et al., 2010; Dolan, Slebodnik, & Taylor-Piliae, 2022), and older adults' perceptions of their fall risk has been conceptually developed (Soh et al., 2021). Falls efficacy, understood as one's self-efficacy or confidence at avoiding falls, was initially developed to measure FOF (Tinetti et al., 1990). Since then, the concept of falls efficacy has evolved to include balance confidence (Soh et al., 2021). However, while measures for different components of falls efficacy exist (Soh et al., 2021), measures of FOF are often the only measure used to assess older adults' perceived fall risk (Delbaere et al., 2010; Dolan, Slebodnik, & Taylor-Piliae, 2022). Even though FOF is prevalent in 20%–39% of older adults (Scheffer et al., 2008), not all older adults have FOF. Moreover, not all older adults who consider themselves as having a balance problem have FOF, as indicated by the recent phenomenological study findings (Dolan & Pool, 2023; Dolan, Rishel, et al., 2022). Thus, older adults' perceptions of their own fall risk must be explored beyond measures of FOF.

While older adults' physical balance performance has been measured (Garbin & Fisher, 2023), studies exploring older adults' perception of their balance are limited. Yet, in their prospective study of physical and psychological measures to predict falls among older adults ($N=54$), Landers et al. (2016) found balance confidence to be the best predictor of falling. Using the term 'balance problems' may be a more acceptable term among older adults and better describe their perceived susceptibility for falling. Further, assessing older adults' perceived balance problems may help identify perceived (self-reported) fall risk both among older adults who suffer from FOF and among those who do not. However, commonly used fall risk assessment tools in both primary and acute care only include questions regarding older adults' history of falls and do not assess older adults' perceived balance (Kim et al., 2007; Phelan & Ritchey, 2018). Assessing older adults' perceived balance may improve their inclination to discuss balance problems and potential subsequent accidental falls. The identification of balance problems may be important to identifying fall risk. Thus, exploring perceived balance in relation to falls in larger samples of older adults is needed. The National Health and Aging Trends Study (NHATS) is a longitudinal cohort study of a national representative sample of Medicare beneficiaries age 65 and older. The NHATS data set include self-reported falls, FOF and self-reported balance problem variables that allow initial retrospective exploration of associations between the variables among a large sample of community-dwelling older adults (Montaquila et al., 2012). This insight is needed for further research involving perceived balance and fall risk among older adults, which is foundational for developing assessment tools and person-centred interventions to decrease accidental falls among older adults.

What does this paper contribute to the wider global clinical community?

- Older adults' perceived balance is significantly associated with self-reported falls in the last month, which has not been previously documented in the literature.
- Perceived balance should be assessed among older adults in both the community and long-term and acute care to help determine fall risk status.

1.1 | Aim

The aim of this study was to examine the extent to which perceived balance problem is associated with falls in a nationally representative sample of community-dwelling older adults. The hypotheses were

H1. Self-reported falls are associated with socio-demographic variables (race, ethnicity, education and living area).

H2. Self-reported falls are associated with health factor variables (recent hospital admission, comorbidities, surgery, use of mobility device, hearing, vision, pain, depression and anxiety).

H3. Self-reported falls are associated with perceived susceptibility variables (having a balance problem, FOF, self-rated health status and self-rated memory status).

H4. Self-reported falls are positively associated with FOF and perceived balance problems, with balance problems being more strongly associated with self-reported falls than FOF.

1.2 | Theoretical framework

The Health Belief Model (HBM) was selected as the theoretical framework, and the model posits that individuals wish to avoid illness and that health actions will prevent health threats (Rosenstock, 1974). In the HBM, the concept of *perceived susceptibility* refers to an individual's acceptance of personal susceptibility to a health threat. Demographic variables are included in the HBM, because they are associated with preventative health behaviours. Moreover, the HBM posits that health beliefs are modifiable through health education and interventions (Rosenstock, 1974). For the current study, the HBM guided the statistical analysis, where self-reported falls was the health threat and the outcome variable. Socio-demographics, health factors and individual perceptions were grouped as independent variables (See Figure 1).

2 | METHODS

2.1 | Design

This study was a retrospective cross-sectional secondary analysis using the National Health and Aging Trends Study (NHATS) data from the year 2015 ($N = 8334$) (National Health and Aging Trends Study, n.d.). Survey and functional test data are collected yearly, and the ongoing study is being conducted by the John Hopkins University Bloomberg School of Public Health (DeMatteis et al., 2016). The National Health and Aging Trends Study (NHATS) is sponsored by the National Institute on Aging (grant number NIA U01AG32947) and was conducted by Johns Hopkins University. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist for cross-sectional studies was used, as applicable, for reporting this study (See Appendix S1).

2.2 | Study setting and sampling

The sampling frame for NHATS is the Medicare enrolment database where 96% of adults age 65 and older in the United States (US) are enrolled. A three-stage sampling design was used where counties

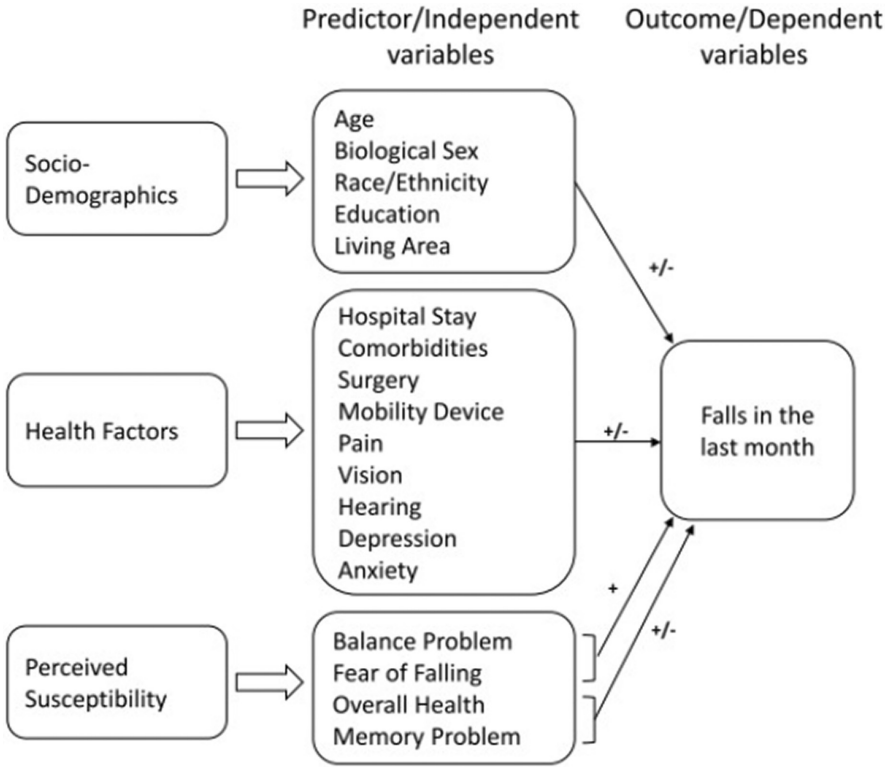

FIGURE 1 Theoretical framework.

were first selected, followed by zip codes or zip code fragments within counties and then individuals. In addition, the oldest age groups, particularly those over the age of 90, were oversampled as were Black/non-Hispanic participants (Montaquila et al., 2012). The sample in the NHATS was replenished in 2015, with 4152 participants remaining from Round 1 in 2011, and 4182 new participants added in Round 5 in 2015. The sampling strategy for Round 5 was to replace the youngest age group (ages 65–69) and those who had either died or been lost in follow up in other age groups (DeMatteis et al., 2016).

2.3 | Inclusion criteria

The participants in this secondary analysis included those who were living independently in the community and able to respond to the surveys on their own. Thus, Round 5 in 2015 was selected due to being the most recent round that included individuals of all ages from age 65 and up. In addition, Round 5 was the most recent round with the largest sample of participants as the sample was replenished.

2.4 | Instruments

Based on the purpose of the study and guided by the theoretical framework, a subset of NHATS data was selected for this secondary analysis. The outcome variable was falls, and the independent variables were centred around the participants' perceptions regarding their balance, FOF, health status and memory status. In addition, known correlates of accidental falls among older adults were included in the study. These included socio-demographic and health factor variables. Each group of variables will be described below.

2.4.1 | Outcome variable

The outcome variable was self-reported falls in the last month. The participants responded either 'yes' or 'no' to the question; 'In the last month, have you fallen down?' The definition of a fall used in the NHATS is 'any fall, slip, or trip in which you lose your balance and land on the floor or ground or lower level' (Guralnik et al., 1995).

2.4.2 | Independent variables

Socio-demographic variables

The socio-demographic independent variables include age, biological sex, race, ethnicity, education level and living area. Participants reported this information during their first interview in either Round 1 or Round 5. Race and ethnicity were categorized into Black non-Hispanic, Hispanic and White non-Hispanic. American Indian, Alaska Native, Asian, Native Hawaiian, Pacific Islander and Other were categorized into underrepresented groups. The nine levels of education were categorized into no schooling to 12th grade without diploma, high school graduate to high school and some college, and associate to graduate degree. Lastly, living area was included as metropolitan or non-metropolitan area.

Health factors

Independent variables selected for the health factors' group were variables, available in NHATS, that are known physical and mental health factors associated with falls in older adults (Deandrea et al., 2010). Physical comorbidities were measured by the number of diseases participants reported, and these conditions included heart attack, heart disease, high blood pressure, arthritis, osteoporosis, diabetes, lung disease, stroke, dementia/Alzheimer's and cancer. The use of a mobility device used to go outside in the last month was categorized into a binary variable (i.e. use or not) and included a cane, walker, wheelchair or scooter. Additional variables were whether the participants had a hospital stay within the last year, and if they had suffered from pain, or used glasses, contacts or hearing aids in the last month. Participants' surgery in the last year was categorized into a binary variable (i.e. surgery or not) and included either knee, hip, cataract, back/spine or heart surgery.

Mental health factors were represented in the analysis with symptoms of depression and anxiety (Deandrea et al., 2010). Depression symptoms were measured using the Patient Health Questionnaire-2 (PHQ-2) (Löwe et al., 2010). The two questions included were 'over the last month, how often have you had little interest or pleasure in doing things?' and 'over the last month, how often have you felt down, depressed, or hopeless?'. Anxiety symptoms were measured using the Generalized Anxiety Disorder Screener (GAD-2) (Kroenke et al., 2007). The two questions included were 'over the last month, how often have you felt nervous, anxious, or on edge?' and 'over the last month, how often have you been unable to stop or control worrying?'. The response options to both scales were 'not at all', 'several days', 'more than half the days' and 'nearly every day'. We created composite variables for the PHQ-2 and the GAD-2 by computing the means across the respective items, with a mean computed for a composite variable if a participant had a response to at least one of two items. The PHQ-2 and the GAD-2 have well-established reliability and validity (Kroenke et al., 2003; Kroenke et al., 2007; Löwe et al., 2010). Higher scores indicated higher symptom levels of depression and anxiety.

Perceived susceptibility

The independent variables focused on perceived susceptibility included perceived balance problems, FOF, perceived memory problems and perceived health status. These variables were associated with perceptions of fall risk among older adults (Dolan, Rishel, et al., 2022; McInnes et al., 2011) and available in the NHATS data set. For perception of balance, participants were asked if they had problems with balance or coordination in the last month with a response of 'yes' or 'no'. Similarly, for FOF, the participants were asked if they in the last month had worried about falling down, with a 'yes' or 'no' response. Participants were also asked to rate their memory

in the last month and perceived health status as either 'excellent', 'very good', 'good', 'fair' or 'poor'. Higher scores indicate poorer memory and poorer perceived health status.

2.5 | Data analysis

We first examined basic descriptive statistics and frequencies to identify if implausible or outlying values were present for the study variables as well as determine the extent of incomplete data. There were no implausible or outlying values, but there was missing data, particularly for the predictors used in the regression analysis, which we address below. We also examined values of the variance inflation factor to assess multicollinearity and found excessive multicollinearity was not present (as the value of each variance inflation factor was less than 2.0).

To describe the sample, we obtained descriptive statistics and conducted bivariate statistical tests (i.e. the complex samples adjusted Wald *F* test or the complex samples likelihood ratio chi-squared test) with fall status (i.e. reported fall vs. no fall in the past 30 days) and each study variable. Weighted estimates that use Taylor series linearization to obtain standard errors and adjust for features in the NHATS study design were obtained with the SPSS complex analysis procedure, version 28. The NHATS Round 5 survey weights used in the analysis account for differential probabilities of selection and unit non-response.

To test study hypotheses, three hierarchical logistic regression models were estimated with the participant-reported outcome of having a fall in the last month (fall = 1; no falls = 0). The first model included a block of demographic variables: age, male (male = 1; female = 0), race/ethnicity (with three dummy-coded variables: Black non-Hispanic, Hispanic, underrepresented groups, with White non-Hispanic serving as the reference group), educational attainment (with two dummy-coded variables: high school and some college, did not graduate high school, with college graduates as the reference group) and living area (metropolitan = 1; otherwise = 0). The second regression model added a set of binary health-related variables: whether a participant reported being hospitalized in the past year, having a surgery in the last year, using a mobility device, wearing glasses or contacts, wearing a hearing aid or being bothered by pain (each variable coded as yes = 1; 0 = no). This second block of variables also included self-reported number of comorbidities, PHQ-2 and GAD-2 items. The third regression model added the perceived susceptibility variables: whether a participant reported having balance issues in the last month (yes = 1; 0 = no), worried about falling in the last month (yes = 1; 0 = no), as well as self-rated overall health and memory problems. We also conducted a statistical test to assess the difference between logistic regression coefficients that link (a) balance problems to falls and (b) FOF to falls, as well as obtained estimates of model-based probabilities of reporting a fall for participants who reported having a balance problem and participants who reported FOF. These model-based probabilities were obtained holding all other regression predictors constant at their mean, that is, for the participant having 'typical' values for all other predictors. Odds ratios were obtained to describe the degree to which each variable was related to reporting a fall, and R^2 and ΔR^2 were used to describe the strength of association between a given set of variables and the outcome. Note that the R^2 for logistic regression represents the proportion of variance explained in the latent outcome that underlies the binary observed falls outcome (Long, 1997).

In addition, although we used the NHATS survey weights for the logistic regression analysis to adjust for design features, these weights do not address incomplete survey responses. Unlike the bivariate analysis, where a small proportion of data was missing for each pair of variables, 808 cases (11%) would have been discarded from the logistic regression analysis had we used listwise deletion, with the removal of nearly all cases due to data missing generally across the predictors. Given that exclusion of cases with complete data on an outcome but missing on predictors can lead to biased parameter estimates (Muthén et al., 2016), we used multiple imputation (Lang & Little, 2018) to impute 100 data sets, exceeding the recommended number of 20 imputed data sets (Graham et al., 2007). Using the Markov Chain Monte Carlo algorithm in Mplus software (Muthén & Muthén, 1998–2023), we generated an imputed data set at every 20,000th iteration of the process, with this interval suggested by values of less than 1.01 of the potential scale reduction factor for each parameter, indicating model convergence (Gelman & Rubin, 1992). The data imputation model included all of the variables involved in the regression analyses, as well as the NHATS weighting variables. Note that Rubin (1987) formulas were used to combine the parameter estimates and standard errors from the 100 imputed data sets into a final set of results.

2.6 | Ethical considerations

The NHATS was approved by the Institutional Review Board (IRB) at John Hopkins University, and all participants provided informed consent. IRB approval for this study (IRB ID STUDY00017753) was obtained from Arizona State University.

3 | RESULTS

3.1 | Characteristics of the sample

This study included 7499 participants, with 871 (10.3%) reporting having fallen in the last month. Table 1 shows that, compared to those who did not report a fall in the last month, participants who reported a fall were, on average, older (76.22 vs. 74.75, $p < .001$), and reported, on average, more comorbidities (2.95 vs. 2.38, $p < .001$), greater depression symptom scores on the PHQ-2 (1.77 vs. 1.41, $p < .001$), greater anxiety symptoms on the GAD-2 (1.73 vs. 1.40, $p < .001$), poorer self-reported overall health (3.17 vs. 2.62, $p < .001$) and greater memory problems (2.92 vs. 2.58, $p < .001$). In addition, Table 1 shows that a greater percentage of participants reported

TABLE 1 Descriptive statistics and test results for the study variables by self-reported fall status in the last month.

Characteristic	*N*	Did not fall in the past month *n* = 6622 (89.7%) (weighted %)	Fell in the last month *n* = 871 (10.3%) (weighted %)	*p* value[a]
Age (years) (M = 78.2 [SD = 7.84])	7493	M = 74.75 (SE = .083)	M 76.22 (SE = 0.258)	<.001*
Biological sex				
Female	7493	3837 (89.2)	493 (10.8)	.740
Male		2785 (89.4)	378 (10.6)	
Race/ethnicity				
Black, non-Hispanic	7305	1349 (91.8)	146 (8.2)	.207
Hispanic		388 (89.6)	53 (10.4)	
Underrepresented groups[b]		325 (88.3)	45 (11.7)	
White, non-Hispanic		4394 (89.1)	605 (10.9)	
Education				
Not graduated high school	7311	1385 (87.3)	215 (12.7)	.055
High school and some college		3137 (89.3)	406 (10.7)	
≥ Associate degree		1937 (90.3)	231 (9.7)	
Living area				
Metropolitan	7493	5389 (89.6)	678 (10.4)	.164
Non-metropolitan		1233 (87.9)	193 (12.1)	
Stay in hospital last year				
Yes	7474	1394 (84.6)	262 (15.4)	<.001*
No		5210 (90.5)	608 (9.5)	
Number of comorbidities	7492	M = 2.38 (SE = 0.023)	M = 2.95 (SE = 0.054)	<.001*
Surgery in the last year				
Yes	7467	817 (87.3)	136 (12.7)	.058
No		5782 (89.6)	732 (10.4)	
Use of mobility device (cane, walker, wheelchair or scooter)				
Yes	7493	1746 (80.2)	406 (19.8)	<.001*
No		4876 (91.8)	465 (8.2)	
Vision (wears glasses or contacts)				
Yes	7426	4019 (89.2)	517 (10.8)	.837
No		2547 (89.4)	343 (10.6)	
Hearing (uses hearing aids)				
Yes	7484	1028 (87.4)	163 (12.6)	.023*
No		5586 (89.6)	707 (10.4)	
Pain				
Yes	7483	3482 (85.8)	617 (14.2)	<.001*
No		3132 (93.3)	252 (6.7)	
PHQ-2[c]	7487	M = 1.41 (SE = 0.010)	M = 1.77 (SE = 0.028)	<.001*
GAD-2[d]	7478	M = 1.40 (SE = 0.010)	M = 1.73 (SE = 0.036)	<.001*
Perceived problems with balance				
Yes	7487	1964 (77.0)	568 (23.0)	<.001*
No		4652 (94.3)	303 (5.7)	
Fear of falling				
Yes	7486	1847 (83.4)	389 (16.6)	<.001*
No		4770 (91.5)	480 (8.5)	
Perceived overall health (means)	7487	M = 2.62 (SE = 0.020)	M = 3.17 (SE = 0.045)	<.001*
Perceived memory problems (means)	7047	M = 2.58 (SE = 0.016)	M = 2.92 (SE = 0.044)	<.001*

* $p < .05$.

[a]Represents the *p* value for the complex samples adjusted Wald *F* test or the complex sample likelihood ratio chi-squared test.

[b]Underrepresented groups represent American Indian, Alaska Native, Asian, Native Hawaiian, Pacific Islander and Other.

[c]The Patient Health Questionnaire 2 (PHQ-2) was used in the NHATS data set to assess for depression.

[d]The Generalized Anxiety Disorder scale 2 (GAD-2) was used in the NHATS data set to assess for anxiety.

having fallen in the last month if they reported being hospitalized within the last year versus not (15.4% vs. 9.5%, $p < .001$), using a mobility device versus not (19.8% vs. 8.2%, $p < .001$), using a hearing aid versus not (12.6% vs. 10.4%, $p = .023$), having pain versus not (14.2% vs. 6.7%, $p < .001$), having an issue with balance versus not (23.0% vs. 5.7%, $p < .001$) and having FOF versus not (16.6% vs. 8.5%, $p < .001$).

3.2 | Logistic regression analysis

Table 2 shows the results of the logistic regression analysis, which indicated that each block of variables was related to the likelihood of reporting a fall in the last month. Specifically, the set of demographic variables (H1) included in the first block were related to the

TABLE 2 Hierarchical logistic regression results for self-reported fall status in the past 30 days ($N = 7499$).

	Model 1			Model 2			Model 3		
	b (SE)	OR	*p*	*b* (SE)	OR	*p*	*b* (SE)	OR	*p*
Intercept	−3.868 (0.441)	–	–	−4.177 (0.455)	–	–	−3.834 (0.454)	–	–
Age	0.024 (0.005)	1.024	<0.001*	0.008 (0.006)	1.008	0.170	0.001 (0.006)	1.001	0.875
Male[a]	0.005 (0.081)	1.005	0.952	0.169 (0.083)	1.184	0.042*	0.136 (0.088)	1.146	0.122
Black[b]	−0.344 (0.112)	0.709	0.002*	−0.442 (0.111)	0.643	<0.001*	−0.487 (0.114)	0.614	<0.001*
Hispanic[c]	−0.140 (0.190)	0.870	0.460	−0.230 (0.196)	0.795	0.242	−0.274 (0.200)	0.761	0.170
Underrepresented[d]	0.079 (0.168)	1.083	0.638	−0.045 (0.186)	0.957	0.809	−0.075 (0.173)	0.929	0.666
High school and some college[e]	0.077 (0.091)	1.080	0.400	−0.110 (0.093)	0.896	0.234	−0.132 (0.096)	0.876	0.169
Did not graduate high school[f]	0.276 (0.136)	1.318	0.042*	−0.092 (0.139)	0.912	0.506	−0.200 (0.144)	0.819	0.163
Living area[g]	−0.149 (0.119)	0.862	0.210	−0.112 (0.116)	0.894	0.336	−0.081 (0.106)	0.922	0.445
Stay in hospital last year[h]	–	–	–	0.155 (0.105)	1.167	0.140	0.129 (0.107)	1.137	0.228
Number of comorbidities	–	–	–	0.063 (0.028)	1.065	0.024*	−0.009 (0.030)	0.991	0.763
Surgery in last year[i]	–	–	–	−0.019 (0.143)	0.981	0.894	−0.002 (.147)	0.998	0.991
Use of mobility device[j]	–	–	–	0.633 (0.119)	1.882	<0.001*	0.345 (0.128)	1.412	0.007*
Vision[k]	–	–	–	−0.019 (0.086)	0.981	0.825	−0.063 (0.085)	0.939	0.458
Hearing[l]	–	–	–	0.098 (0.110)	1.103	0.373	0.079 (0.111)	1.082	0.478
Pain[m]	–	–	–	0.485 (0.093)	1.624	<0.001*	0.303 (0.093)	1.353	0.001*
PHQ[n]	–	–	–	0.306 (0.059)	1.358	<0.001*	0.175 (0.060)	1.191	0.004*
GAD[o]	–	–	–	0.263 (0.070)	1.300	<0.001*	0.158 (0.067)	1.171	0.018*
Balance problem[p]	–	–	–	–	–	–	1.212 (0.101)	3.362	<0.001*
Fear of falling[q]	–	–	–	–	–	–	−0.209 (0.120)	0.811	0.081
Overall health	–	–	–	–	–	–	0.118 (0.045)	1.125	0.009*
Memory problem	–	–	–	–	–	–	0.084 (0.045)	1.088	0.091
R^2	.017	–	<0.001*	.118	–	<0.001*	.175	–	<0.001*
R^2 change	.017	–	<0.001*	.101	–	<0.001*	.057	–	<0.001*

* $p < .05$.

[a]Is coded as male = 1, female = 0.

[b]Is coded as Black = 1, otherwise = 0.

[c]Is coded as Hispanic = 1, otherwise = 0.

[d]Is coded as underrepresented groups = 1, otherwise = 0.

[e]Is coded as high school and some college = 1, otherwise = 0.

[f]Is coded as did not graduate high school = 1, otherwise = 0.

[g]Is coded as metropolitan Area = 1, non-metropolitan area = 0.

[h]Is coded as a stay in the hospital the last year = 1, no stay in the hospital the last year = 0.

[i]Is coded as had surgery in the last year = 1, did not have surgery in the last year = 0.

[j]Is coded as use a mobility device (cane, walker, scooter or wheelchair) = 1, does not use mobility device = 0.

[k]Is coded as wears glasses or contacts = 1, does not wear glasses or contacts = 0.

[l]Is coded as wears hearing aid = 1, does not wear hearing aid = 0.

[m]Is coded as bothered by pain = 1, no bothered by pain = 0.

[n]Patient Health Questionnaire – 2.

[o]General Anxiety Disorder.

[p]Is coded as had balance issues in the last month = 1, did not have balance issues in the last month = 0.

[q]Is coded as worried about falling the last month = 1, not worried about falling the last month = 0.

likelihood of reporting a fall (model $R^2 = .017$, $p < .001$). In addition, the proportion of variance increased significantly when the set of health-related variables (H2) was added to the model ($\Delta R^2 = .101$, $p < .001$) and when the perceived susceptibility variables (H3) were added in the model ($\Delta R^2 = .057$, $p < .001$).

As shown in Table 2, after all variables were included in the model, several variables were associated with reporting a fall in the last month. For the perceived susceptibility variables (H3), having a balance problem ($p < .001$) and overall rating of health status ($p = .008$) were associated with falls. Specifically, the odds ratios indicated that the odds of reporting a fall were approximately 3.4 times greater for those who reported having a balance problem than not having a balance problem and about 1.1 times greater as self-rated overall health scores increased (or worsened) by 1 point on the five-point scale. Note that FOF ($p = .08$) and perceived memory problems ($p = .10$), each significantly related to falls in the bivariate analysis, were not uniquely associated with falls in the multivariable regression analysis. In addition, the logistic regression coefficients linking balance problems to falls ($b = 1.212$) and FOF to falls ($b = -.209$) significantly differed, 1.212 to − 0.209 = 1.421 (SE = .171), OR = 4.144 (SE = .708), $p < .001$ (H4). This result indicates that participants who reported a balance problem were more likely to report having fallen, probability = .18, than participants who reported FOF, probability = .07. Further, for the set of general health-related variables (H2), using a mobility device ($p < .001$) and reporting pain ($p = .008$) were each positively associated with reporting a fall in the last month as were the PHQ-2 ($p < .004$) and the GAD-2 ($p < .018$). For the demographic variables (H1), the only variable significantly associated with falls involved the comparison of Black non-Hispanic and White non-Hispanic participants, where Black non-Hispanics were less likely to report having fallen in the last month compared to Whites ($p < .001$).

4 | DISCUSSION

The findings from this study supported our hypotheses, generated by our theoretical model that having a fall, as reported by participants in the past month, was associated with each of the sets of socio-demographic (H1), health-related (H2) and perceived susceptibility variables (H3). The regression analysis was especially informative due to its ability to examine each variable's unique contribution to self-reported falls in the last month. This analysis revealed that perceived balance problem was strongly associated with reporting a fall in the last month, whereas FOF was not associated with falls. In addition, a test for the difference in logistic regression coefficients indicated that perceived balance problems were more strongly associated with falls compared to the association between FOF and falls (H4). Other variables uniquely associated with reporting a fall were using a mobility device, being in pain, feeling down or depressed and inability to stop worrying. In addition, Black non-Hispanics were less likely to report a fall compared to White non-Hispanic, and individuals who reported higher self-reported health status were less likely to report a fall.

The primary finding of this study is that, in this large sample of older adults, reporting a perceived balance problem was uniquely associated with self-reported falls in the last month, as this, to our knowledge, has not been previously reported in the literature. In a smaller sample of older adults, Landers et al. (2016) found that perceived balance confidence was a better predictor of falling than FOF, avoidance behaviour and a standard balance performance test (Timed 'Up & Go' Test) among a sample of older adults. The researchers concluded that older adults' sense of balance and associated fall risk may be a better indicator of their balance ability than balance performance tests. Our findings support this premise. Research among hospitalized older adults have shown that most hospitalized older adults do not believe they are at risk for falling in the hospital despite being assessed as at risk for falling by nursing assessments (Dolan, Slebodnik, & Taylor-Piliae, 2022). However, the term 'fall risk', not balance issues, was used in these studies, and the older adults' perceptions regarding their own fall risk may not have been adequately captured. Assessing for balance problems may help to adequately identify fall risk among older adults.

From a developmental perspective, older adults are known to prefer positive information over negative information in both attention and memory, and this preference is referred to as the concept of positivity effect (Mather & Carstensen, 2005). The positivity effect helps older adults to regulate their emotions and increases their mood and well-being. Compared to younger adults, older adults have been found to have better emotional regulation and may use avoidant strategies by ignoring negative stimuli that results in emotional distress (Birditt, 2013). For this reason, older adults may prefer the term 'having a balance problem', as it has a more positive connotation than 'fall risk'. Older adults may also be more inclined to discuss balance problems with their healthcare providers than discussing fall risk. In this sample of community-dwelling older adults, only 10% reported a fall, which is less than the estimated 30% of older adults who suffer a fall each year (Bergen et al., 2016). While this may have been due to recall bias, the older adults in this sample may also have been disinclined to report falls. Recasting of 'fall risk' to 'balance issues' may improve older adults' self-reporting of balance impairment and associated accidental falls, which is paramount for engaging in interventions to decrease fall risk.

FOF is a common predictor of falls among older adults (Deandrea et al., 2010). As hypothesized for our study, FOF was significantly correlated with self-reported falls in the last month among this sample of older adults (H3). However, after controlling for socio-demographics, health-related factors and the other perceived susceptibility variables, FOF was no longer significantly associated with self-reported falls. This may be due to the fact that not all older adults, who are at risk for falling, have FOF. Measuring perceived balance problems may capture the older adults who are not fearful of falling but consider themselves as having a balance problem that could lead to falls. Further research is needed to explore the older adults' perceptions of balance in relation to FOF and fall prevention behaviour as a foundation for developing person-centred fall prevention interventions to decrease falls among older adults.

For the past three decades, the concept of falls efficacy has been developed and explored both theoretically and empirically in gerontology. The initial conceptualization of falls efficacy was used to measure FOF, but falls efficacy has since then evolved to include other psychological constructs, such as balance confidence (Soh et al., 2021). In recent years, older adults' perceived fall risk has been explored (Dolan, Slebodnik, & Taylor-Piliae, 2022). However, perceived fall risk is often measured with instruments focused on FOF (Delbaere et al., 2010; Dolan, Slebodnik, & Taylor-Piliae, 2022). In this large sample of older adults, perceived balance problems were more strongly associated with self-reported falls in the last month than FOF. FOF may not cover the range of perceptions that older adults have regarding their own fall risk, where perceived balance may better cover this range of perceptions and may be a more acceptable term among older adults. In our study, the correlation between FOF and perceived balance is not high ($r = .43$), suggesting that these constructs are not the same and therefore are not interchangeable. Our finding that FOF and perceived balance are differentially related to self-reported falls seems to confirm that perceived balance is different from FOF. This may add to the continues evolvement of measures to explore falls efficacy among older adults.

The findings of this study are limited by the retrospective cross-sectional design, where causality cannot be determined. Thus, exploring older adults' perceived balance in relation to accidental falls in prospective longitudinal studies is warranted. Moreover, as eloquently outlined by Soh et al. (2021), falls efficacy is a multidimensional construct that must be further developed in both theory and practice to support older adults in all aspects falls management, including losing balance, falling safely and post-fall recovery. Including older adults' perceptions, beliefs and language surrounding this topic is imperative in this effort.

In our study, perceived poor health status was significantly associated with self-reported falls in the last month. Note that the limited research of older adults' perceived health status in relation to accidental falls has produced contradictory findings. Some evidence indicates that perceived health status is associated with fall risk (Deandrea et al., 2010). However, other studies have found that relationships among poor perceived health status and reported falls are not significant (Machón et al., 2016). Further research to determine the relationship between perceived health status, balance problems and falls among older adult adults is needed.

Consistent with findings in previous studies, we found that participants who were Black non-Hispanic had fewer self-reported falls than Whites non-Hispanics (Garbin & Fisher, 2023). Similarly, we found that higher levels of depression and anxiety symptoms were also associated with self-reported falls (Hallford et al., 2017). Not only are symptoms of depression and anxiety associated with recurrent falls in older adults, medications to treat depression and anxiety such as antidepressants, sedatives and hypnotics, increase older adults' risk for falls (Ming & Zecevic, 2018). As such, assessing and treating older adults for depression is important to decrease their risk of recurrent falls (Choi et al., 2019).

Among this sample of older adults, self-reported pain in the last month was also associated with self-reported fall in the last month. Pain is an often-overlooked fall risk factor among older adults (Stubbs et al., 2014). Experiencing pain, especially in the lower extremities, can lead to impaired gait and balance deficits, which are known predictors of falls among older adults (Deandrea et al., 2010). Healthcare providers must not only assess older adults for pain, but thoroughly assess fall risk in the older adults who report pain (Stubbs et al., 2014). Discussing balance problems and experiences of pain with older adults may be important components of fall prevention efforts among this population.

4.1 | Limitations

There are limitations to this study. First, some factors associated with fall risk in older adults are not included in the NHATS data set. A known key predictor of fall risk in community-dwelling older adults is polypharmacy (Deandrea et al., 2010). However, information regarding participants' amount of medication use was not included in the NHATS study, and we were unable to include this measure. Participants' comorbidities may indirectly indicate potential polypharmacy, in that participants with more comorbidities may use more medications. Second, the limitation of cross-sectional designs is that causality cannot be determined. Self-report data are prone to recall bias, and older adults are known to underreport accidental falls (Hoffman et al., 2018). Lastly, measures of perceived balance and FOF were single-item questions, which may not capture all relevant aspects of these variables.

5 | CONCLUSION

This study explored the relationship between self-reported falls in the last month and socio-demographic, health factor and perceived susceptibility variables in a large sample of community-dwelling older adults in the NHATS. After controlling for other fall-related variables, perceived balance problems were significantly and uniquely associated with self-reported falls in the last month. Our findings, drawn from a large national study, support the findings of two previous research studies with smaller samples of older adults, where older adults preferred the term balance problems as opposed to the term fall risk. Exploring balance problems among older adults may provide more accurate insight into older adults' perceptions regarding their own fall risk. The identification of older adult perception of balance problems in routine assessment may inform healthcare providers as to older adult fall risk. Future studies must further explore older adults' perceptions of their balance problems, which is foundational for developing novel interventions to prevent falls among older adults.

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CONFLICT OF INTEREST STATEMENT

We have no conflict of interest to declare.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available in National Health and Aging Trends Study at https://www.nhats.org/researcher/data-access.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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