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Research Article

Perceived Walking Speed, Measured Tandem Walk, Incident Stroke, and Mortality in Older Latino Adults: A Prospective Cohort Study

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Abstract

Background: Walking speed is associated with functional status and all-cause mortality. Yet the relationship between walking speed and stroke, also a leading cause of disability, remains poorly understood, especially in older Latino adults who suffer from a significant burden of stroke.

Methods: A total of 1,486 stroke-free participants from the Sacramento Area Latino Study on Aging, aged 60 and older at baseline in 1998–1999, were followed annually through 2010. Participants reported their usual walking speed outdoors which was classified into slow, medium, or fast. We also assessed timed tandem walk ability (unable or eight or more errors vs less than eight errors). We ascertained three incident stroke endpoints: total stroke, nonfatal stroke, and fatal stroke. Using Cox proportional hazards models, we estimated hazard ratios (HRs) for stroke at different walking speed and timed tandem walk categories.

Results: Over an average of 6 years of follow-up (*SD* = 2.8), the incidence rate of total strokes was 23.2/1,000 person-years for slow walkers compared to 15.6/1,000 person-years for medium walkers, and 7.6/1,000 person-years for fast walkers. In Cox models adjusted for sociodemographics, cardiovascular risk, cognition and functional status, and self-rated health, the hazard of total stroke was 31% lower for medium walkers (HR: 0.69, 95% confidence interval [CI]: 0.47, 1.02) and 56% lower for fast walkers (HR: 0.44, 95% CI: 0.24, 0.82) compared with slow walkers. We found similar associations with timed tandem walk ability (fully adjusted HR: 0.66, 95% CI: 0.45, 0.98).

Conclusions: Our findings suggest perceived walking speed captures more than self-rated health alone and is a strong risk factor for stroke risk in Latino older adults.

Keywords: Epidemiology—Minority aging—Physical function—Stroke—Walking speed

Measured walking speed is associated with functional and disability status (1) and is predictive of institutionalization (2), adverse health outcomes (3,4), and all-cause mortality (5,6). While stroke is a leading cause of disability and death in the United States (7) and a substantial source of health care expenditures (8), only few studies (5,9–11) examined the relationship between walking speed and stroke incidence. The majority of these studies were conducted in White cohorts. Latinos suffer from a greater burden of stroke compared with non-Latino Whites (12), yet the relationship between walking speed and stroke risk in Latinos has not been examined, partly due to the lack in comprehensive data addressing health in minorities.

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Perceived walking speed is a simple and feasible measure for assessment during brief clinical interactions. Prior studies have demonstrated that it correlates well with measured walking speed (13,14) and is a strong predictor of overall functional mobility and status (15). A recent cross-national comparison found that the correspondence between perceived and objective mobility measures was generally high but, substantially, varied by country and culture (16). These findings, along with others (17), suggest that perceived walking speed may be capturing both walking speed and a sense self-rated health.

Furthermore, in prospective cohorts of older adults, attrition due to mortality is inevitable. Mortality rates are nearly three times as high among subjects with slow measured walking speed or poor functional performance (5,6). Therefore, premature mortality may preclude the occurrence of a stroke event and may influence the observed association between walking speed (perceived or measured) and stroke incidence. To our knowledge, previous research on walking speed and stroke incidence have not accounted for the competing risk of mortality.

In the current study, we use data from the Sacramento Area Latino Study on Aging (SALSA), a large epidemiologic study of community-dwelling Latinos aged 60 and older at baseline followed for nearly 10 years, to address the gaps in the literature on walking speed and stroke incidence. Specifically, we examined the association between each of perceived walking speed (primary predictor) and timed tandem walk (secondary predictor) and stroke incidence. We conducted both conventional analyses and analyses that account for the competing risk of mortality.

Methods

Study Population

SALSA is a longitudinal cohort study of 1,789 community-dwelling Mexican American older adults residing in the Sacramento area who were aged 60–101 years at baseline in 1998–1999. Every 12–15 months, we collected social, biological, and clinical data during structured in-home visits. We also obtained updates on medications, health events, and risk factors during a semiannual phone interview. There were a total of seven in-home examinations and six semiannual phone interviews between 1998 and 2007. Details of the study design have been described elsewhere (18). The SALSA study has been approved annually by the Institutional Review Board at the University of Michigan and the University of California, San Francisco and Davis. Of the 1,789 participants in the study, we excluded 168 participants with a history of stroke at baseline. In analyses of perceived walking speed, we also excluded 135 participants with missing walking speed or who reported unable to walk or never walked outdoors, resulting in a final sample size of 1,486 participants. In analyses of timed tandem walk, we also excluded 135 participants with missing tandem walk, resulting in a final sample size of 1,486 participants.

Assessment of Stroke Event

We ascertained stroke events at each home visit and phone interview by a self-report of a physician diagnosis. We also included stroke events that were recorded as a cause of death in death certificates. We used codes (I60–I69) from the Tenth Revision of the International Statistical Classification of Diseases to classify stroke as a cause of death anywhere on the death certificate. In this study, we examine three endpoints of an incident stroke event: (i) total stroke (nonfatal or fatal), (ii) nonfatal stroke, and (iii) fatal stroke.

Assessment of Mortality (Competing Event)

Deaths were identified using online obituary, review of Social Security Death Index, vital statistics data files from the state of California, and interviews with family members. We defined the competing event appropriately for each outcome of interest: for outcomes of "total" stroke and "fatal" stroke, the competing event was any death unrelated to stroke; for outcomes of "nonfatal" stroke, the competing event was any death.

Assessment of Perceived Walking Speed (Primary Predictor)

At the baseline examination, participants reported their perceived walking speed. Specifically, we asked participants to report their usual walking pace outdoors with six possible responses. We then classified participants' walking speed into: *slow* if they reported "easy, casual"; *medium* if they reported "normal/average"; and *fast* if they reported "brisk pace" or "very brisk/striding." These categories have been previously published (19). Participants with responses of "unable to walk" or "never walked outdoors" were excluded as mentioned above. Our measure of perceived walking speed included several potential responses, thus depicting a broad range of functional capacity, which has been shown to be more reliable compared to measures with a narrow range of functional capacity (eg, able vs unable) (20).

Assessment of Timed Tandem Walk (Secondary Predictor)

At baseline, we measured timed tandem walk. Participants had to walk along a 5-foot tape with the feet placed in a tandem position (ie, heel of the foot in front touching the toe of the foot behind). We counted the number of errors that participants made, where an error was defined as touching the examiner or the wall, stepping off the line, or taking a step with a heel-toe separation. In line with the literature (21), we defined timed tandem walk ability as performing less than eight errors versus unable to tandem walk or more than or equal to eight errors. Tandem walk is a clinical technique for assessing dynamic balance ability and is an established test part of the neurological examination (21,22). While timed tandem walk may not be ideal for assessing walking speed, it provides an objective clinical assessment of walking ability and balance.

Assessment of Self-rated Health and Other Covariates

At baseline, participants reported their self-rated health with categories of excellent, very good, good, fair, and poor. We then categorized self-rated health into excellent/very good/good versus fair/poor. Demographic variables included age, gender, and education (less than high school, completed high school, and more than high school). We measured standing height and weight and we calculated body mass index (kg/m^2). We collected fasting blood samples to perform tests, including interleukin-6 (pg/dL). We measured seated blood pressure using an automatic digital blood pressure monitor. We collected prescription medication information at each home visit by reviewing the participant's medication containers. We ascertained type 2 diabetes by a self-report of physician diagnosis, fasting blood glucose level, 126 mg/dL or more, or use of diabetes medication. Participants reported their history of coronary heart disease and a diagnosis of atrial fibrillation. We defined elevated depressive symptoms as a score of more than or equal to 16 on the 20-item Center

Table 1. Baseline Characteristics of Stroke-Free SALSA Participants, by Perceived Walking Speed and Tandem Walk Ability

	Perceived Walking Speed (*N* = 1,486)				Timed Tandem Walk Ability (*N* = 1,486)		
	Slow Walker	Medium Walker	Fast Walker		Unable or ≥8 errors	<8 errors	
Covariates	*n* = 385	*n* = 822	*n* = 279	*p* Value	*n* = 380	*n* = 1,106	*p* Value
Age, y, mean (*SD*)	71 (7.6)	70 (6)	69 (6)	<.001	74.3 (7.9)	68.9 (6.0)	<.001
Gender, % female	63.6	55.0	58.8	<.05	67.9	55.4	<.001
Education, y, mean (*SD*)	6.6 (5.1)	7.1 (5.4)	9.2 (5.4)	<.001	6.0 (4.9)	7.9 (5.5)	<.001
SBP, mm Hg, mean (*SD*)	139.9 (20.3)	138.8 (18.7)	135.9 (18.0)	<.05	141.4 (21.6)	137.3 (18.5)	<.001
BMI, kg/m^2, mean (*SD*)	30.4 (6.4)	29.9 (5.5)	28.4 (5.5)	<.001	30.2 (6.7)	29.6 (5.6)	.15
Diabetes, % yes	35.8	29.4	25.1	<.01	39.7	28.7	<.001
Atrial fibrillation, % yes	6.8	5.0	3.6	.16	6.1	5.4	.61
Coronary heart disease, % yes	16.9	10.5	8.2	<.001	16.1	11.1	.01
Antihypertensive use, % yes	46.2	39.3	34.8	<.01	54.0	40.3	<.001
Interleukin-6, pg/dL, mean (*SD*)	6.3 (11.4)	4.8 (5.1)	4.1 (4.0)	<.001	6.3 (5.8)	4.7 (7.4)	<.001
Elevated CES-D, % yes	33.7	21.7	16.5	<.001	36.8	19.6	<.001
MMSE score, mean (*SD*)	84.1 (11.6)	85.7 (10.4)	89.3 (10.1)	<.001	79.1 (18.0)	87.2 (10.5)	<.001
Limitation in ADL, % yes	19.2	6.1	3.6	<.001	27.6	4.7	<.001
Self-rated health, % fair/poor	56.6	47.4	31.9	<.001	53.2	42.7	<.001

Note: ADL= activities of daily living, BMI= body mass index, CES-D= Center for Epidemiologic Studies Depression Scale, MMSE= mini mental state exam, SALSA= Sacramento Area Latino Study on Aging, SBP= systolic blood pressure.

for Epidemiologic Studies Depression Scale. We assessed global cognitive function using the Modified Mini-Mental State Exam (range 0–100). Finally, we assessed activities of daily living using the Katz index, and we defined a participant as having activities of daily living limitations if they reported a limitation in any of the seven items.

Statistical Analysis

We first compared baseline characteristics of our study participants across categories of perceived walking speed and timed tandem walk ability based on an analysis of variance test for continuous variables and a chi-squared test for categorical variables. We tabulated the distribution of tandem walk ability across categories of perceived walking speed. We then estimated incidence rates (IRs) of stroke events per 1,000 person-years at risk (along with 95% confidence intervals [CIs]) within categories of perceived walking speed, timed tandem walk ability, and their cross-tabulation by dividing the number of stroke events in each category by the number of person-years at risk contributed by each participant within that category. To evaluate the need for analyses that account for the competing risk of mortality, we examined the risk of overall mortality within categories of perceived walking speed and timed tandem walk ability with Kaplan–Meier survival curves.

To examine the association between each of perceived walking speed, timed tandem walk ability, and stroke incidence, we conducted both conventional analyses and analyses that account for the competing risk of mortality. In conventional analyses, we used Cox proportional hazards models with time from enrollment until first incident stroke event as the time index. In analyses that account for the competing risk of mortality, we examined the associations of walking speed, tandem walk, and stroke incidence with Fine & Gray competing risk regression models where we treated death as a competing event (23,24). In competing risk models, we observed participants from study entry until the occurrence of stroke (event of interest), death (competing event), or censoring at last date of contact. As mentioned in the section Assessment of Mortality (Competing Event), we defined the competing event appropriately for each outcome of interest. Models adjusting for the competing risk of overall mortality provide estimates more relevant for clinical predictions (24).

Table 2. Distribution of Perceived Walking Speed and Tandem Walk Ability

	Slow (*n* = 348)	Medium (*n* = 757)	Fast (*n* = 268)
Unable or ≥8 errors (*n* = 319)	130 (37.4)	169 (22.3)	20 (7.5)
<8 errors (*n* = 1,054)	218 (62.6)	588 (77.7)	248 (92.5)

In both traditional Cox regressions and Fine & Gray regressions, we used perceived "slow walking speed" or "unable to tandem walk or had ≥8 errors" as the reference categories and we presented hazard ratios (HRs) and 95% CIs. We included covariates in the adjusted models based on a priori literature and their associations with both the predictors and incident stroke. We assessed potential confounders at baseline, including age, sex, education, interleukin-6, systolic blood pressure, elevated depressive symptoms, cognitive function, type 2 diabetes, coronary heart disease, atrial fibrillation, antihypertensive medication use, and any activities of daily living limitation. In analyses of perceived walking speed, we additionally adjusted for self-rated health because perceived walking speed may be in part capturing self-rated health. Because the expected number of fatal stroke events was small among fast walkers, we implemented the Firth-correction and used the "profile penalized likelihood ratio confidence intervals" (23,25) to estimate a valid coefficient for the HRs and its 95% CIs. We also used the profile likelihood of the Poisson model to compute the 95% CI for the IR. All analyses were performed using SAS version 9.3.

Results

In Table 1, we present baseline characteristics of our study participants by categories of walking speed and timed tandem walk. Fast walkers were younger, more likely to be female and more educated,

Table 3. Incident Stroke Events From 1998 to 2007 Among Stroke-Free SALSA Participants, by Perceived Walking Speed and Timed Tandem Walk Ability

	Perceived Walking Speed			Timed Tandem Walk Ability	
	Slow	Medium	Fast	Unable or ≥8 errors	<8 errors
	N = 385	*N* = 822	*N* = 279	*N* = 380	*N* = 1,106
Total stroke					
Number of cases (%)	51 (13.3)	77 (9.4)	14 (5.0)	61 (16.1)	95 (8.6)
Person-years at risk	2195.39	4940.77	1844.83	2108.78	7021.48
Nonfatal stroke					
Number of cases (%)	39 (10.1)	57 (6.9)	14 (5.0)	44 (11.6)	75 (6.8)
Person-years at risk	2195.39	4940.77	1844.83	2108.78	7021.48
Fatal stroke					
Number of cases (%)	15 (3.9)	23 (2.8)	0 (0)	22 (5.8)	20 (1.8)
Person-years at risk	2327.47	5142.57	1906.92	2250.80	7302.60

Note: Number of cases (%): % corresponds to the percent of cases within categories of perceived walking speed and timed tandem walk ability. SALSA = Sacramento Area Latino Study on Aging.

had lower systolic blood pressure, lower prevalence of antihypertensive use, and lower prevalence of diabetes compared to slow or medium walkers. Additionally, faster walkers had less depressive symptoms, higher cognitive score on the Modified Mini-Mental State Exam, fewer activities of daily living limitations, and lower prevalence of fair/poor self-rated health. Similar patterns were observed across categories of timed tandem walk (less than eight errors vs unable or eight or more errors).

Our measures of perceived walking speed and timed tandem walk are correlated (Table 2). A total of 37.4% of slow walkers were unable to tandem walk or eight or more errors compared to 22.3% of medium walkers and only 7.5% of slow walkers.

Over an average of 6 years (*SD* = 2.8), stroke event (total, nonfatal, and fatal) IRs were higher among slow walkers compared to medium or fast walkers (Table 3; Figure 1). For example, the IR of total strokes was 23.2/1,000 person-years for slow walkers compared to 15.6/1,000 person-years for medium walkers, and 7.6/1,000 person-years for fast walkers; that is, the IR ratio for total stroke was 0.67 among medium walkers and 0.33 among fast walkers compared to slow walkers. Similarly, the IRs of stroke events were higher among those unable to tandem walk or had eight or more errors (IR = 28.9/1,000 person-years) compared to those who tandem walked with less than eight errors (IR = 13.5/1,000 person-years). Similar patterns of IRs were observed when using the cross-tabulation of the two predictors (walking speed and tandem walk ability). For example, the IRs of stroke events were higher among slow walkers who were unable to tandem walk or had eight or more errors (IR = 29.1/1,000 person-years) compared to slow walker who tandem walked with less than eight errors (IR = 20.5/1,000 person-years) (Table 4).

Figure 2 illustrates the risk of overall mortality within categories of walking speed and timed tandem walk using Kaplan–Meier survival curves. Figure 2A shows lower survival in slow walkers than medium or fast walkers. Figure 2B shows lower survival in those unable to tandem walk or had eight or more errors than those with less than eight errors. For example, over an average of 6 years, there were 258 competing events (as overall mortality): 111 among slow walkers, 119 among medium walkers, and 28 among fast walkers. The higher mortality among "slow walkers" and those "unable to tandem walk or had ≥8 errors" provides the motivation for conducting competing risk regressions (Fine & Gray).

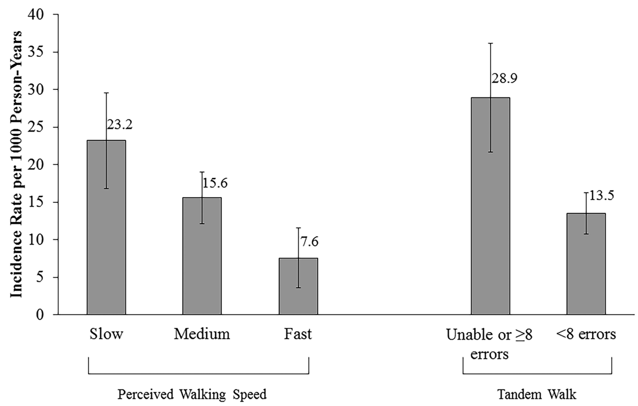

Figure 1. Incidence rates (per 1,000 person-years) and 95% confidence intervals of total stroke within categories of perceived walking speed and timed tandem walk ability in older Latinos who participated in the Sacramento Area Latino Study on Aging from 1998 through 2007.

Table 5 shows the associations between perceived walking speed and incident stroke from Cox proportional hazard models. In adjusted Cox models, including adjustment for self-rated health, there was a clear gradient such that the risk of total stroke, nonfatal stroke, and fatal stroke was lower among medium and fast walkers compared to slow walkers. For example, the hazard of total stroke was 31% lower for medium walkers (HR: 0.69, 95% CI: 0.47, 1.02) and 56% lower for fast walkers (HR: 0.44, 95% CI: 0.24, 0.82) compared with slow walkers. Results were unchanged after we additionally adjusted for tandem walk ability in a final model.

Overall, the relationship between perceived walking speed and incident stroke persisted after we accounted for the competing risk of mortality in Fine & Gray models (data not shown). For example, from the adjusted Fine & Gray model, the hazard of total stroke was 26% lower for medium walkers (HR: 0.74, 95% CI: 0.49, 1.12) and 53% lower for fast walkers (HR: 0.47; 95% CI: 0.25, 0.86) compared with slow walkers.

Table 6 shows the associations between timed tandem walk ability and incident stroke from Cox proportional hazard models. In adjusted Cox models, those who tandem walked with less than eight errors had a significantly lower risk of total stroke, nonfatal stroke, and fatal stroke compared to those who were unable to tandem walk

Table 4. Incident Stroke Events From 1998 to 2007 Among Stroke-Free SALSA Participants, by the Joint Distribution of Perceived Walking Speed and Timed Tandem Walk Ability

	Slow Walker		Medium Walker		Fast Walker	
	Unable or ≥8 errors	<8 errors	Unable or ≥8 errors	<8 errors	Unable or ≥8 errors	<8 errors
	N = 130	*N* = 218	*N* = 169	*N* = 588	*N* = 20	*N* = 248
Total stroke						
Number of cases (%)	21 (16.2)	27 (12.4)	23 (13.6)	49 (8.3)	1 (5.0)	13 (5.2)
Person-years at risk	721.69	1319.87	1000.23	3715.26	117.84	1657.50
Nonfatal stroke						
Number of cases (%)	16 (12.3)	23 (10.6)	20 (11.8)	36 (6.1)	1 (5.0)	13 (5.2)
Person-years at risk	721.69	1319.87	1000.23	3715.26	117.84	1657.50
Fatal stroke						
Number of cases (%)	8 (6.2)	4 (1.8)	5 (3.0)	13 (2.2)	0 (0)	0 (0)
Person-years at risk	771.11	1402.53	1069.57	3846.74	123.51	1713.92

Note: Number of cases (%): % corresponds to the percent of cases within categories of perceived walking speed and timed tandem walk ability. SALSA = Sacramento Area Latino Study on Aging.

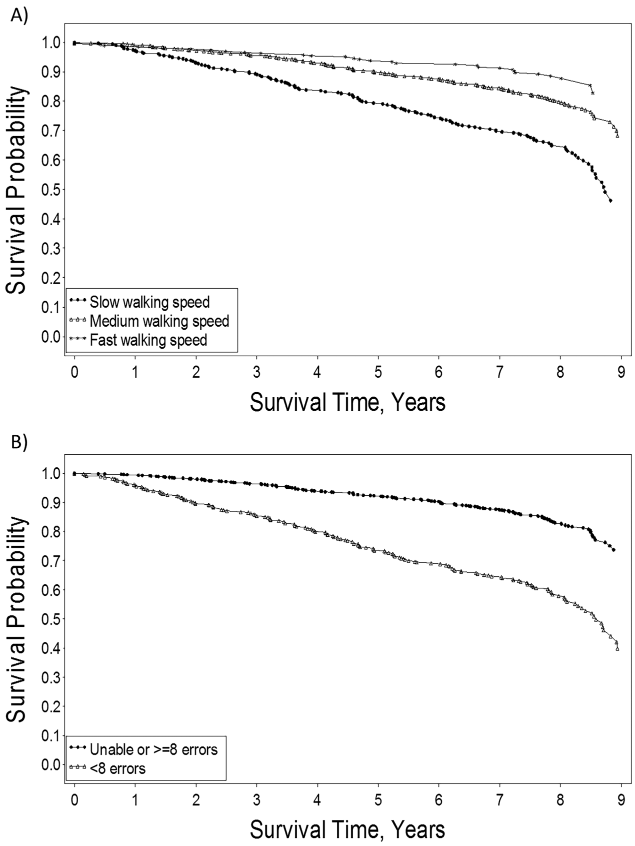

Figure 2. Survival probability by category of (**A**) perceived walking speed and (**B**) timed tandem walk ability in older Latinos who participated in the Sacramento Area Latino Study on Aging from 1998 through 2007. Log rank test <0.0001.

or had eight or more errors. For example, the hazard of total stroke was 34% lower for those with less than eight errors versus those unable or had eight or more errors (HR: 0.66, 95% CI: 0.45, 0.98). Results were slightly attenuated after additionally adjusting for perceived walking speed in a final model, and the association between tandem walk ability and total stroke became nonsignificant. Overall, the associations remained the same in Fine & Gray regression models (data not shown).

Discussion

In a population of stroke-free community-dwelling Latino older adults, perceived walking speed was a strong risk factor for incident stroke. In models adjusting for multiple stroke risk factors, including self-rated health, fast walkers had a 56% lower risk of total stroke compared with slow walkers. Our findings were only slightly attenuated when we accounted for the competing risk of mortality. The strength of the associations highlight the utility of perceived walking speed, which could feasibly be assessed during brief clinical interactions, as a powerful risk factor for stroke among Latino older adults. We found similar associations between timed tandem walk, an objective clinical assessment, and stroke incidence.

Only few previous analyses were conducted to examine the association between walking speed and stroke incidence, none of which included minority populations or accounted for the competing risk of mortality (5,9–11). For example, in the Cardiovascular Health Study, a cohort of mostly older White men and women, seconds to walk 15 feet was a strong independent predictor of future stroke (9) and stroke death (11). These results were corroborated with data from the Women's Health Initiative, a cohort of predominantly White postmenopausal women (10). Our findings using perceived walking speed, above and beyond self-rated health, are consistent with these prior findings using measured walking speed (9–11). In fact, HRs of incident total stroke in our study were similar to those reported in the Cardiovascular Health Study (9) and perhaps more pronounced than those reported in the Women Health Initiative (10). Furthermore, our findings showing similar and significant associations between timed tandem walk and stroke incidence corroborates our confidence in our findings using perceived walking speed.

There are several potential mechanisms through which perceived walking speed may influence stroke risk. As discussed earlier, perceived walking speed may be capturing both walking speed and a sense of self-rated health, which in turn may influence stroke risk though mechanisms similar to those operating in the relationship between self-rated health and cardiovascular events (26). Our findings remained significant even after we adjusted for self-rated health, suggesting perceived walking speed captures more than self-rated health alone. Brain magnetic resonance imaging studies can also shed light on potential mechanisms underlying the association between walking speed and stroke risk. MRI studies have shown that structural brain changes of vascular origin, such as white matter

Table 5. Associations of Perceived Walking Speed With Stroke Risk From Cox Proportional Hazards Models, Among Stroke-Free SALSA Participants (*N* = 1,486)

	Unadjusted		Adjusted*		Adjusted* + Tandem Walk	
	HR	95% CI	HR	95% CI	HR	95% CI
Total stroke						
Slow walking speed	1.00	Referent	1.00	Referent	1.00	Referent
Medium walking speed	**0.67**	**0.47, 0.95**	0.69	0.47, 1.02	0.70	0.47, 1.04
Fast walking speed	**0.32**	**0.18, 0.59**	**0.44**	**0.24, 0.82**	**0.46**	**0.25, 0.87**
Nonfatal stroke						
Slow walking speed	1.00	Referent	1.00	Referent	1.00	Referent
Medium walking speed	**0.65**	**0.43, 0.98**	0.69	0.44, 1.06	0.70	0.45, 1.08
Fast walking speed	**0.43**	**0.23, 0.79**	0.55	0.29, 1.05	0.59	0.31, 1.13
Fatal stroke†						
Slow walking speed	1.00	Referent	1.00	Referent	1.00	Referent
Medium walking speed	0.64	0.34, 1.25	0.67	0.30, 1.49	0.68	0.31, 1.52
Fast walking speed	**0.04**	**0.00, 0.28**	**0.06**	**0.00, 0.43**	**0.06**	**0.00, 0.45**

Notes: CI = confidence interval; HR = Hazards ratio; SALSA = Sacramento Area Latino Study on Aging. The significance for the bold values are $p < .05$.

*Adjusted for age, gender, education, body mass index, interleukin-6, systolic blood pressure, elevated depressive symptoms, Modified Mini-Mental State Exam score, diabetes, atrial fibrillation, coronary heart disease, antihypertensive medication, any activities of daily living limitation, and self-rated health.

†HR and 95% CI were computed using the Firth-correction and the "profile penalized likelihood ratio confidence intervals."

Table 6. Associations of Timed Tandem Walk Ability With Stroke Risk From Cox Proportional Hazards Models, Among Stroke-Free SALSA Participants (*N* = 1,486)

	Unadjusted		Adjusted*		Adjusted* + Walking Speed	
	HR	95% CI	HR	95% CI	HR	95% CI
Total stroke						
Unable or ≥8 errors	1.00	Referent	1.00	Referent	1.00	Referent
<8 errors	**0.47**	**0.34, 0.64**	**0.66**	**0.45, 0.98**	0.72	0.48, 1.09
Nonfatal stroke						
Unable or ≥8 errors	1.00	Referent	1.00	Referent	1.00	Referent
<8 errors	**0.51**	**0.35, 0.74**	**0.59**	**0.38, 0.92**	**0.64**	**0.41, 1.00**
Fatal stroke						
Unable or ≥8 errors	1.00	Referent	1.00	Referent	1.00	Referent
<8 errors	**0.29**	**0.16, 0.53**	0.77	0.35, 1.72	1.01	0.43, 2.49

Notes: CI = confidence interval; HR = Hazards ratio; SALSA = Sacramento Area Latino Study on Aging. The significance for the bold values are $p < .05$.

*Adjusted for age, gender, education, body mass index, interleukin-6, systolic blood pressure, elevated depressive symptoms, Modified Mini-Mental State Exam, diabetes, atrial fibrillation, coronary heart disease, antihypertensive medication, and any activities of daily living limitation.

hyperintensities, which are well-established predictors of ischemic stroke (27,28), are associated with decreased walking speed over time (29). These findings suggest that slow walking speed could reflect subclinical changes happening to the brain and thus could be a marker of subclinical cerebrovascular disease in older adults. Thus, slow walking speed may help to identify people at risk for stroke independently of traditional stroke risk factors (10). In fact, prior research from the Cardiovascular Health Study showed that measured walking speed was the only independent predictor of stroke death among participants with incident stroke (11).

Although the SALSA study offers a unique opportunity to examine the relationship between walking speed and stroke incidence in Latinos, there are some limitations worth noting. First, having measured walking speed would have been informative for the comparability of the current findings to other studies. However, our estimated associations between perceived walking speed and stroke risk, adjusting for self-rated health, are comparable to those reported in prior studies with measured walking speed. Second, our measure of timed tandem walk, an objective clinical assessment of dynamic balance and walking ability, is not an ideal measure to assess walking speed. Yet, our findings still showed similar and significant associations to those observed with perceived walking speed. Finally, our stroke ascertainment was based on self-report of physician diagnosis and ICD codes from death certificates, both of which are subject to inaccuracies; however, such misclassification is likely nondifferential.

This study has many important strengths. Our findings extend prior knowledge based primarily on White cohorts (5,9–11) by corroborating these results in a high-risk and growing U.S. minority population. Our findings suggest perceived walking speed captures more than self-rated health alone and is rather a strong risk factor of stroke risk. To our knowledge, this is the first study of stroke risk in Latinos that accounts for the competing risk of mortality, making our findings more relevant for clinical predictions. Furthermore, the longitudinal study design allowed us to establish appropriate temporal order and report incident stroke.

In summary, in our cohort of community-dwelling Latino older adults, perceived walking speed was a strong risk factor of incident stroke. Our findings highlight the utility of perceived walking speed as a powerful risk factor which could feasibly be assessed during brief clinical interactions.

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Conflict of Interest

None.

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