

Usual Versus Quick Walking Speed: Differential Associations with Cognition, Depression, Stroke, and Dementia in the Framingham Heart Study

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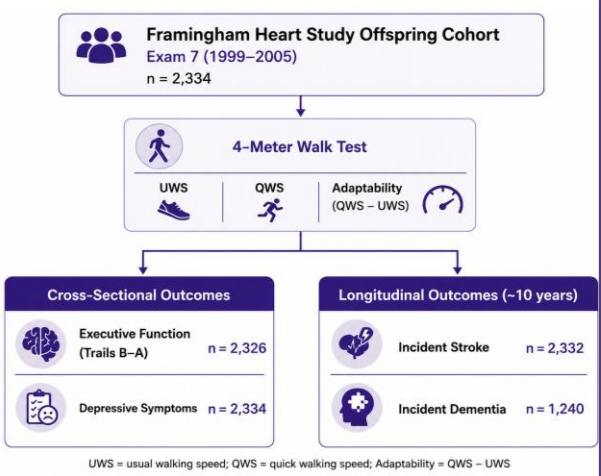


KEY TAKE AWAY: Gait adaptability and volitional gait capacity may help distinguish neurological vulnerability associated with dementia from patterns more closely linked to depression or stroke

BACKGROUND

- Gait speed is a well-established marker of neurological and cardiovascular health.
- Prior studies have focused on usual walking speed (UWS), which reflects an individual's typical walking pace.
- Quick walking speed (QWS) requires volitional acceleration, greater cognitive-motor integration, and the ability to adapt gait to changing demands.
- Whether UWS and QWS demonstrate distinct associations with cognitive, psychiatric, and vascular outcomes remains unclear.

SAMPLE CHARACTERISTICS



METHODS

Study Population
Framingham Heart Study Offspring participants with gait and outcome data available at Exam 7.

Gait Measures
Usual walking speed (UWS), quick walking speed (QWS), and gait adaptability (QWS–UWS) were assessed using a standardized 4-meter walk test.

Outcomes
Incident dementia (~10-year follow-up). Executive function (Trails B–A) and depressive symptoms (cross-sectional); incident stroke

Analysis
Multivariable linear, logistic, and Cox proportional hazards models adjusted for demographic and clinical covariates.

RESULTS

Associations between Slower Walking Speed (Quick Walk and Usual Walk) and Various Outcomes, Adjusting for Age and Sex¹

	Quick Walk Speed ² ↓ 1 SD		Usual Walk Speed ² ↓ 1 SD		Difference between QW and UW ² ↓ 1 SD	
	HR (95% CI)	p-value	HR (95% CI)	p-value	HR (95% CI)	p-value
Incident Dementia, 10 Year Follow Up						
	1.31 (1.08, 1.59)	0.007	1.19 (0.97, 1.45)	0.098	1.19 (0.97, 1.46)	0.098
Neuropsychological Testing	β±SE	p-value	β±SE	p-value	β±SE	p-value
Log(Trails B–A)	-0.020±0.004	<0.001	-0.014±0.004	<0.001	-0.012±0.004	0.003
High Depressive Symptoms (CES-D≥16) ³	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value
	1.24 (1.07, 1.45)	0.005	1.26 (1.09, 1.46)	0.002	1.04 (0.90, 1.20)	0.627
Incident Stroke, 10 Year Follow Up	HR (95% CI)	P-value	HR (95% CI)	P-value	HR (95% CI)	P-value
	1.30 (1.03, 1.64)	0.025	1.36 (1.11, 1.65)	0.003	0.96 (0.75, 1.24)	0.772

For Dementia: ¹ Overall Model: adjusted for sex; ² Usual Walk Speed, Quick Walk Speed, and Difference between Quick Walk and Usual Walk are natural log transformed to normalize their distributions, standardized, and then multiplied by -1.
For Neuropsychological testing, depression and stroke
¹ Overall Model: adjusted for sex; ² Usual Walk Speed, Quick Walk Speed, and Difference between QW and US are natural log transformed to normalize their distributions, standardized, and then multiplied by -1.
³ Adjusted for education.

1

Quick Walking Speed May Be More Informative for Dementia Risk



Slower quick walking speed was associated with a higher risk of incident dementia, whereas the association for usual walking speed was weaker and did not reach statistical significance.

2

Gait Adaptability Adds Complementary Information



Gait adaptability (the ability to increase walking speed when challenged) was associated with better executive function, suggesting it captures aspects of cognitive-motor function beyond walking speed alone.

3

A Simple Clinical Measure with Broad Relevance



A brief 4-meter walk test captures information relevant to cognition, mood, vascular risk, and neurodegeneration, supporting its use as a practical addition to brain health assessment.

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