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Original Study

Self-Reported Walking Speed: A Useful Marker of Physical Performance Among Community-Dwelling Older People?

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A B S T R A C T

Background: Walking speed is central to emerging consensus definitions of sarcopenia and frailty as well as being a major predictor of future health outcomes in its own right. However, measurement is not always feasible in clinical settings. We hypothesized that self-reported walking speed might be a good marker of objectively measured walking speed for use in this context.
Methods: We investigated the relationship between self-reported and measured walking speed and their associations with clinical characteristics and mortality using data from 730 men and 999 women, aged 61 to 73 years, who participated in the Hertfordshire Cohort Study. Walking speed was measured over 3 meters. Participants rated their walking speed as "unable to walk," "very slow," "stroll at an easy pace," "normal speed," "fairly brisk," or "fast."
Results: Self-reported walking speed was strongly associated with measured walking speed among men and women ($P < .001$). Average walking speeds ranged from 0.78 m/s (95% CI 0.73–0.83) among men with "very slow" self-reported walking speed to 0.98 m/s (95% CI 0.93–1.03) among "fast" walkers (corresponding figures for women were 0.72 m/s [95% CI 0.68–0.75] and 1.01 m/s [95% CI 0.98–1.05]). Self-reported and measured walking speeds were similarly associated with clinical characteristics and mortality; among men and women, slower self-reported and measured walking speeds were associated ($P < .05$) with increased likelihood of poor physical function, having more systems medicated and with increased mortality risk, with and without adjustment for sociodemographic and lifestyle factors (hazard ratios for mortality per slower band of self-reported walking speed, adjusted for sociodemographic and lifestyle characteristics: men 1.44 [95% CI 1.11–1.87]; women 1.35 [95% CI 1.02–1.81]).
Conclusion and Implications: Self-reported walking speed is a good marker of measured walking speed and could serve as a useful marker of physical performance in consensus definitions of sarcopenia and frailty when direct measurement of walking speed is not feasible.

Walking speed is now widely measured in research settings and increasingly of interest in the clinical setting. Moreover, it now features in emerging consensus definitions of sarcopenia and frailty.[1–3] Slower customary walking speed among community-dwelling older men and women is a risk factor for adverse outcomes,[4] including disability in activities of daily living (ADLs),[5] falls and institutionalization,[4] fracture and cognitive decline,[6] and mortality.[7]

Guralnik et al[8] first outlined a protocol for measurement of customary, or usual, walking speed in 1994 as part of a short physical performance battery (SPPB) developed for the assessment of lower extremity function among community-dwelling men and women aged 71 years and older who participated in the Epidemiologic Studies of the Elderly in the United States. The SPPB comprised tests of balance, rising from a chair, and walking at usual pace across an 8-foot walking course; poorer (lower) overall summary physical performance scores were strongly associated with increased self-reported levels of disability in ADLs, such as walking half a mile and climbing stairs, and identified individuals at increased risk of nursing home admission or mortality.[8]

The authors declare no conflicts of interest.

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Since Guralnik et al's early paper,[8] direct measurement of physical performance has become commonplace in epidemiological studies, and walking speed has been proposed as an appealing way of screening the functional status of older people in research and clinical settings.[9] In 2009, an International Academy on Nutrition and Ageing (IANA) Taskforce concluded that measured walking speed "is a quick, safe, inexpensive and highly reliable" single-item assessment tool that identifies community-dwelling people at risk of adverse outcomes.[4]

However, measurement of walking speed requires training of observers; the implementation of a strict measurement protocol if reliable and comparable measures are to be obtained in different research studies and clinical settings; and takes longer than simply asking a person to self-report their customary walking speed. Moreover, not all research studies involve face-to-face contact with study participants (eg, large postal surveys) and not all research and clinical settings have the space to set up a walking course. In addition, an older person may temporarily lack the ability to complete a walking assessment if he or she is currently acutely unwell, injured, or hospitalized. An alternative approach to characterizing customary walking speed would therefore be of value in settings in which direct measurement is not feasible.

Guralnik et al[8] suggested that "performance measures can validly characterize older persons across a broad spectrum of lower extremity function" but emphasized that measurement and self-report approaches complement each other to provide a full assessment of an older person's functional status; Sainio et al[10] and Sakari-Rantalal et al[11] support this argument. On this basis, we propose that a simple screening question that asks an individual to select the option that best describes his or her usual walking speed may be useful in epidemiological and clinical settings in which direct measurement of walking speed is not achievable.

We conducted a search of OVID MEDLINE(R) for articles in the literature that describe the association between self-reported and objectively measured walking (or gait) speed. Several articles demonstrated associations between measured walking speed and self-reports of level of *function*, *limitations*, or *disability* in walking or mobility ADLs,[10–14] but no articles were identified that investigated whether self-reported walking *speed* is a good marker of measured walking speed.

We have therefore evaluated the association between self-reported and directly measured walking speed among the community-dwelling older men and women who participated in the Hertfordshire Cohort Study (HCS), UK.[15] We investigated whether self-reported and measured walking speeds demonstrate similar patterns of association with a range of sociodemographic, lifestyle, and clinical characteristics and mortality outcome. Finally, we determined the impact of using self-reported rather than measured walking speed in the European Working Group on Sarcopenia (EWGSOP) consensus algorithm for the diagnosis of sarcopenia.[16]

Methods

Study Population

The HCS comprises a group of men and women born in that county between 1931 and 1939 whose birth, infancy, and early childhood were documented by Health Visitors. A total of 1579 men and 1418 women aged 59 to 73 years who still lived in Hertfordshire between the end of 1998 and 2004 were interviewed at home by a trained research nurse and subsequently attended clinics for detailed physiological investigations (herein referred to as the HCS baseline interview and clinic). The study has been described in detail previously.[15]

Self-reported walking speed was ascertained at the HCS baseline interview by asking the participant: "Which of the following best describes your walking speed?" Participants selected one of the following response options: "unable to walk," "very slow," "stroll at an easy pace," "normal speed," "fairly brisk," or "fast". The baseline interview also ascertained social history (including age left full-time education, own current or most recent full-time occupation, and husband's current or most recent full-time occupation for ever-married women), lifestyle factors (smoking habit and alcohol intake), self-assessed health-related quality of life (using the Short-Form 36 [SF-36] questionnaire[17]) and medical history (comprising fracture history, previous diagnosis of high blood pressure, stroke/transient ischemic attack, diabetes [out of pregnancy], symptoms of bronchitis, typical angina [according to the Rose chest pain questionnaire], history of coronary artery bypass graft or angioplasty, and details of all currently prescribed or over-the-counter medications, coded to the British National Formulary).

Investigations conducted at the HCS baseline clinic included measurement of height (to the nearest 0.1 cm using a Harpenden pocket stadiometer [Chasmors Ltd, London, UK]) and weight (to the nearest 0.1 kg on a SECA floor scale [Chasmors Ltd]). Skinfold thickness was measured with Harpenden skinfold calipers in triplicate at the triceps, biceps, subscapular, and supra-iliac sites on the nondominant side. A 2-hour fasted oral glucose tolerance test was performed using 75 g anhydrous glucose and diabetes mellitus classified according to World Health Organization criteria.[18] Resting blood pressure was recorded as the mean of 3 measurements on a Dinamap Model 8101 (GE Medical Systems, Slough, UK). An electrocardiogram was performed and graded to the Minnesota protocol.[19] Measurement of physical performance using Guralnik et al's short physical performance battery[8] was introduced part way through the HCS fieldwork; time taken to walk 3 meters at a customary pace was recorded to the nearest 1/100th of a second for 767 men and 1031 women but only 730 men and 999 women completed the test according to protocol without the use of a walking aid and were deemed eligible for inclusion in the analysis sample for this manuscript.

Intra- and inter-observer studies were carried out during the fieldwork. The study had ethical approval from the Hertfordshire and Bedfordshire Local Research Ethics Committee and all participants gave written informed consent.

Statistical Methods

Registrar General's social class was coded from the 1990 Standard Occupational Classification (SOC90) unit group for occupation[20] using computer-assisted standard occupational coding.[21] Current social class was coded from own current or most recent full-time occupation for men and never-married women, and from husband's occupation for ever-married women.[22] Number of systems medicated was coded according to the British National Formulary. SF-36 data were mapped to 8 domain scores, including physical function (PF).[17] PF scores were negatively skewed (lower scores implied poorer status) and were dichotomized for analysis: participants with scores in the lowest sex-specific fifth of the distribution ($\leq$75 for men, $\leq$60 for women) were classified as having "poor" PF. Body mass index (BMI) in kg/m^2 was calculated as weight divided by the square of height. Height and weight were highly correlated ($r = 0.45$, $P < .001$ for men; $r = 0.29$, $P < .001$ for women); to avoid multicollinearity problems, a sex-specific standardized residual of weight-adjusted-for-height was calculated for inclusion with height in regression models. Averaged skinfold thickness measurements were used to derive body fat percentage according to the Durnin and Womersley equations.[23] Fat mass was derived by multiplying body weight by percentage body fat.