Title
Gait Speed Reference Values for Adults Aged 90 and Older: The 90+ Study.

Journal
Journal of Geriatric Physical Therapy, 46(3)

Authors
Colcord, Katherine
Kawas, Claudia
Corrada, María

Publication Date
2022-07-01

DOI
10.1519/JPT.0000000000000340

Peer reviewed

HHS Public Access
Author manuscript
J Geriatr Phys Ther. Author manuscript; available in PMC 2024 January 25.

Published in final edited form as:
J Geriatr Phys Ther. 2022 ; 46(3): E106–E112. doi:10.1519/JPT.0000000000000340.

Gait Speed Reference Values for Adults Aged 90 and Older: The 90+ Study

Katherine A. Colcord, PT, DPT[1], **Claudia H. Kawas, MD**[2], **María M. Corrada, ScD, MS**[3]

[1]University of California, Irvine, Department of Epidemiology, California, United States

[2]University of California, Irvine, Department of Neurology, California, United States

[3]University of California, Irvine, Departments of Neurology and Epidemiology, California, United States

Abstract

Background and Purpose: Slow gait speed has been associated with adverse outcomes in older adults, but little data exist for those aged 90 and above, a group often referred to as the "oldest old." We aimed to establish reference values for gait speed in men and women aged 90 and older.

Methods: The 90+ Study is a population-based longitudinal study of aging. Our analyses of gait speed included participants who were evaluated in person and were ambulatory. Gait speed was assessed using the 4-meter walk test. We calculated means, standard deviations, and percentiles stratified by age, sex, and use of assistive device.

Results and Discussion: The 797 participants had a mean age of 93.5 years. Of these, 73.9% were women, 39.5% had a college education, and 98.6% were White. The overall mean gait speed was 0.58m/s (women=0.55m/s, men=0.65m/s). In participants who did not use an assistive device, the overall mean gait speed was 0.66m/s (women=0.63m/s, men=0.71m/s). In those who used a device, the overall mean gait speed was 0.38m/s (women=0.37m/s, men=0.43m/s). Gait speed decreased with increasing age. Men had consistently higher average gait speeds compared with women across age categories. Men and women who used assistive devices had lower average gait speeds across age categories compared with men and women who ambulated with no device. Average gait speeds in our oldest old cohort were slower than those of older adults younger than 90 years of age in previous studies.

Conclusions: This study is the first to establish gait speed reference values specific to adults aged 90 and older. Age-appropriate reference values are crucial to the accurate interpretation of clinical measures for patients in their nineties and above.

Keywords

normative; older adults; walking speed; oldest old; geriatric; physical performance

Address correspondence to Katherine Colcord, University of California, Irvine, 1513 Hewitt Hall, 843 Health Sciences Rd, Irvine, California 92697 (kcolcord@uci.edu) or Maria Corrada, University of California, Irvine, 1513 Hewitt Hall, 843 Health Sciences Rd, Irvine, California 92697 (mcorrada@uci.edu).

The authors declare no conflict of interest.

INTRODUCTION

The proportion of older adults over 90 in the United States has increased substantially in the past several decades. In 1980, people aged 90 and older made up only 2.8% of older adults (age 65 and over). By 2010, this number had increased to 4.7% and it is expected to increase to 10% by 2050.[1] As the number of individuals living into their nineties continues to rise, and the group of oldest old grows larger, it is essential that we establish accurate reference values specific to the physical performance of this age group. One of the most common physical performance measures used in the evaluation of older adults is gait speed. Measuring gait speed requires minimal time and equipment yet is highly valuable in terms of the insight it provides into a person's physical condition. Slow gait speed has been associated with hospitalization, falls, depression, cognitive impairment, disability, frailty, and mortality.[2–6] To contextualize a gait speed measurement, a clinician compares an observed value with reference values for a patient's age and sex. This information can then be used in combination with other components of the assessment to make clinical decisions regarding the patient's care. Thus, reference values are essential to the meaningful analysis of gait speed. Previous studies have defined reference values for gait speed for older adults, but very little data exist for those aged 90 and above. We hypothesized that gait speeds in people aged 90 and older are slower than in younger older adults. Therefore, reference values specific to those aged 90 and above are necessary to correctly classify people within their age categories. In this study, we aimed to fill in the gap that exists for gait speed reference values in the oldest old. Using data from a population-based cohort of individuals aged 90 and older, we aimed to establish gait speed percentiles classified by age, sex, and use of an assistive device.

METHODS

Study Design and Participants

The 90+ Study is a population-based longitudinal study of aging and dementia. Participants are surviving members of the Leisure World Cohort Study, an epidemiological study of older adults initiated in 1981 in a retirement community in Orange County, California. Our analyses of gait speed included participants who were evaluated in person, were ambulatory, and for whom gait speed was recorded during at least one visit between January 1st, 2003 and April 20th, 2020. If participants were unable to travel to our clinic, we performed examinations in their homes. In some cases, we traveled to other states to assess participants who had relocated. Our analyses were cross-sectional and included only the first visit on which gait speed was recorded for each participant.

All participants, or their surrogates, provided informed consent upon enrollment in The 90+ Study. The University of California, Irvine Institutional Review Board reviewed and approved the study. Research was completed in accordance with the Helsinki Declaration.

Data Collection

Background Information and Medical History Participants in The 90+ Study underwent semi-annual evaluations, including past medical history, family medical history, neurological examination, neuropsychological testing, and physical performance assessment. Information on past medical history and falls was obtained either from the participants or, in cases where a participant was unable to provide the information, from the participant's informant, generally a relative or caregiver. We documented potentially relevant variables in our description of the background characteristics of the study participants. These included race and ethnicity, educational level, living situation, chronic disease, assistive device use, and falls. Cardiovascular disease was defined as a history of coronary artery disease, myocardial infarction, atrial fibrillation and other arrhythmias, heart valve disease, congestive heart failure, pacemaker, or coronary artery bypass graft. Cerebrovascular disease was defined as a history of stroke or transient ischemic attack. To obtain information about falls, participants were asked the question, "How many falls have you had in the past year?" Participants who reported falling were asked follow-up questions regarding hospitalization and injuries.

Gait Speed Measurement We assessed gait speed using the 4-meter walk test (4MWT) as part of the Short Physical Performance Battery. The 4MWT has been shown to have excellent test-retest reliability and predictive value when studied in a variety of patient populations.[7–9] To initiate the 4MWT, tape was placed at two points in a hall, marking off a 4-meter section of walkway with 0.6m provided at the beginning of the walkway to allow for an acceleration phase outside of the data collection area and 1.5m provided at the end of the walkway to allow for a deceleration phase outside of the data collection area. Participants were directed to walk at their usual pace and were timed using a stopwatch. Timing began when the participant's first foot crossed the starting tape and ended when the participant's first foot crossed the finish tape. The same testing protocol was used when performing the 4MWT in participants' homes, with a 4-meter chain used to measure the distance instead of tape. Use of assistive device was recorded under the categories of "cane" and "walker." The measured 4MWT time was converted to gait speed in meters per second (m/s) using the formula 4m/time (s).

Data Analyses

We categorized usual gait speed performance by age group (90–94, 95–99, and 100+), sex, and use of assistive device. We calculated means, standard deviations, and percentiles (5^{th}, 10^{th}, 25^{th}, 50^{th}, 75^{th}, 90^{th}, 95^{th}) for each age group and assistive device category in the entire sample and stratified by sex. All analyses were performed using SAS 9.4 (SAS Institute Inc., Cary, NC) statistical software.

RESULTS

Participant Characteristics

A total of 957 surviving members of the LWCS joined The 90+ Study and were evaluated in-person. Our analyses include the 797 participants for whom a gait speed measurement was recorded during at least one visit between January 1^{st}, 2003 and April 20^{th}, 2020 (Figure 1). The mean age of participants was 93.5 years, with a range of 90.0 to 103.3 years. In Table 1, we present the characteristics of the 797 participants stratified by sex. Of these participants, 73.9% were women, 39.5% had a college degree (33.3% of women and 56.9% of men), and 98.6% were White. Overall, 81.6% of participants were living at home with or without a caregiver (78.9% of women and 89.0% of men), 15.8% were in assisted living, and 2.5% were living in nursing homes. In women, the most common chronic conditions were hypertension (59.1%) and osteoarthritis (49.7%). In men, the most common chronic conditions were cardiovascular disease (61.2%) and hypertension (47.6%). About one quarter of women and 13.5% of men had dementia. Overall, 28.9% of participants used an assistive device, including 32.3% of women and 19.1% of men. When participants were asked whether they had fallen in the past year, 44.5% reported at least 1 fall.

Gait Speed Measurements

The mean gait speed in our study was 0.58m/s. Stratified by sex, the mean gait speed was 0.55m/s in women and 0.65m/s in men. The overall mean gait speed was 0.66m/s in participants who did not use an assistive device and 0.38m/s in those who used a device. In women, the mean gait speed was 0.63m/s in those who did not use an assistive device and 0.37m/s in those who used a device. In men, the mean gait speed was 0.71m/s in those who did not use an assistive device and 0.43m/s in those who used a device. In Table 2, we present gait speed means, standard deviations, and percentiles (5^{th}, 10^{th}, 25^{th}, 50^{th}, 75^{th}, 90^{th}, 95^{th}) for women according to age and use of an assistive device. In Table 3, we present gait speed means, standard deviations, and percentiles (5^{th}, 10^{th}, 25^{th}, 50^{th}, 75^{th}, 90^{th}, 95^{th}) for men according to age and use of an assistive device. Mean gait speed was higher in men than in women across age categories. Gait speed decreased with increasing age category, with the exception of women in the 100+ age category who used an assistive device. This group was faster than younger device-using groups of both sexes. Men and women who used assistive devices had consistently slower mean gait speeds across age categories compared with men and women who ambulated with no device. Figure 2 illustrates the distribution of gait speed according to sex, age, and use of an assistive device.

One hundred and sixty of the 957 participants who were evaluated in person did not complete the 4MWT and were excluded from the analysis. These 160 participants had a mean age of 95.3 years, which is higher than the mean age of the 797 participants who completed the 4MWT and were included in the study group analyzed (93.3 years). The excluded participants also had a considerably higher prevalence of dementia (81%) compared with that of included participants (22%). In addition, the prevalence of cerebrovascular disease was 49% in excluded participants compared with 26% in included participants. Twenty percent of the excluded group had 3 or more falls in the past year compared with 9% of the included group. Within the 160 excluded participants, 80 (50%) were unable to complete the 4MWT due to their inability to stand unassisted. Eighteen participants (10%) refused the test before starting and twelve participants (7%) were too fatigued to complete the test. In 3% of the excluded group, the participant or examiner felt unsafe performing the test. Other reasons given for non-completion of the 4MWT included running out of time, tried but unable, testing error, cognitive impairment, and physical impairment.

DISCUSSION

To our knowledge, this study is the first to suggest reference values for gait speed specifically for adults aged 90 and older. We developed reference values for age categories 90–94, 95–99, and 100+ stratified by sex and use of assistive device. The overall mean gait speed was 0.58m/s (0.55m/s in women and 0.65m/s in men). The overall mean gait speed was 0.66m/s in those who did not use an assistive device and 0.38m/s in those who used a device. Gait speed decreased with increasing age. Men had consistently faster average gait speeds compared with women across age categories. Men and women who used assistive devices had slower average gait speeds across age categories compared with men and women who ambulated with no device. Average gait speeds in our oldest old cohort were slower than those of older adults younger than 90 years of age in previous studies.

Reference values for gait speed have been previously identified in younger cohorts. In a 2019 study which enrolled 1,320 individuals as part of the National Institutes of Health Toolbox norming study, mean gait speeds of 0.95m/s in women and 0.97m/s in men were reported in the oldest age category of 80–85. These were faster than the mean gait speeds of 0.55m/s in women and 0.65m/s in men that we found in our 90+ cohort.[10] The Tromsø Study, a 2019 population-based health examination study in Norway, included 7,474 community-dwelling participants with a mean age of 63.2 years. In contrast to the mean gait speeds in our study, the authors reported mean gait speeds of 0.94m/s in women and 0.97m/s in men in the oldest age category of 80+.[11] In a study of physical performance in Thailand with 1,030 community-dwelling participants, mean gait speeds of 0.88m/s in women and 0.97m/s in men were reported in the oldest age category of 80+. Within this oldest age category, only seven participants were 90 or older.[12] In a 2011 meta-analysis with a combined 20,111 individuals, mean gait speeds of 0.94m/s in women and 0.96m/s in men were reported in the oldest age category of 80–99.[13] All of the aforementioned studies have younger oldest age categories and younger mean ages than our study. This explains the faster mean gait speeds in these studies compared with our study. However, consistent with our findings, the authors of these previous studies reported slower gait speeds in older age categories and faster gait speeds in men compared with women across age categories.[10–13]

The fact that we identified slower gait speeds in our oldest old cohort than were previously identified in groups of older adults under 90 years of age in previous studies suggests that it is not sufficient to use reference data from younger groups to inform assessment of adults aged 90 and older. Our findings will assist clinicians to accurately interpret clinical measures of physical performance in the oldest old. Future research is indicated to investigate gait speed cut-points in adults aged 90 and older in relation to risk of falls and other adverse outcomes.

Very few studies have had a sample of people aged 90 and older large enough to develop reference data for gait speed in even one oldest old category. One of the most important strengths of our study was our large 90+ cohort which enabled us to develop reference values for three oldest old age categories. We were also the first study, to our knowledge, to develop a gait speed reference category for centenarians. The addition of these new categories to the previously established data for younger groups adds to the knowledge base surrounding gait speed throughout the lifespan. Another strength of our study was the use of the 4MWT to measure gait speed. The 4MWT has been found to have excellent reliability and has been used frequently in the literature, so our data is readily comparable with that in previous studies. An additional strength of our study was our inclusion of participants who could not travel to the clinic. Traveling to participants' homes, and even to other states, allowed us to include more people and potentially increase the representativeness of our sample.

Despite the major strengths of our study, we also had several limitations. Even though the inclusion of participants who could not travel was a strength of our study, the differences in testing environments between the clinic and the participants' homes could have affected observed gait speed values. To minimize the potential for variability in measured gait speed values due to the testing location, the same 4MWT protocol was carried out regardless of the setting in which the testing took place. Additionally, since walker type was not specified in our study, it was not possible to determine with certainty what type of walker was used by all past participants. However, according to study examiners, all recently tested participants who were documented as using a walker used rolling walkers. Another limitation of our study was our inability to include participants who did not complete the 4MWT. Given that these participants were older and more physically and cognitively impaired than those who completed the 4MWT, it is likely that, had they been tested, their gait speeds would have been slower on average than the participants who completed the test. This may have led to an overestimate of the reference values. An additional limitation was the demographic makeup of our study, which consisted primarily of highly educated White females. However, according to the U.S. Census Bureau, the demographics of our study are somewhat representative of the 90+ population in the U.S., wherein 76% are women and 88% are White. Although, in terms of education, our cohort had nearly three times as many college graduates compared with the national average.[1] One final limitation of our study was the relatively small size of some of the stratified groups. Nonetheless, our groups were larger than those in previous studies and the addition of these groups to the reference value data for gait speed fills a gap in the literature surrounding physical performance in the oldest old.

CONCLUSIONS

In this study, we defined reference values for gait speed in people aged 90 and older. Physical performance reference values specific to the oldest old are crucial to the concept of best practice. Since physiological differences may be present between members of the younger old and oldest old age categories, physical performance of people in their nineties should not be compared with that of people in younger age categories for assessment purposes. Future research establishing reference data in those aged 90 and older for other commonly used physical performance measures is indicated and would benefit clinical practice. Age-appropriate reference values are essential to the accurate interpretation of clinical measures. Access to physical performance reference data specific to the oldest old will allow clinicians to provide informed and nuanced care to patients as they age.

ACKNOWLEDGMENTS

The authors acknowledge the staff and participants of The 90+ Study for their contributions.

This work was supported by NIH Grants R01AG021055 and UF1AG057707.

References

1. He W, Muenchrath MN. 90+ in the United States: 2006– 2008. U.S. Census Bureau. Am Community Surv Reports. 2011;17(Nov):1–28. Accessed December 17, 2021. https://www.census.gov/library/publications/2011/acs/acs-17.html
2. Kyrdalen IL, Thingstad P, Sandvik L, Ormstad H. Associations between gait speed and well-known fall risk factors among community-dwelling older adults. Physiother Res Int. 2019;24(1):1–6. doi:10.1002/pri.1743
3. Abellan Van Kan G, Rolland Y, Andrieu S, et al. Gait speed at usual pace as a predictor of adverse outcomes in community-dwelling older people: an International Academy on Nutrition and Aging (IANA) task force. J Nutr Heal Aging. 2009;13(10):881–889. doi:10.1007/s12603-009-0246-z
4. Binotto MA, Lenardt MH, Rodríguez-Martínez M del C. Physical frailty and gait speed in community elderly: A systematic review. Rev da Esc Enferm. 2018;52(e03392):1–16. doi:10.1590/S1980-220X2017028703392
5. Chou MY, Nishita Y, Nakagawa T, et al. Role of gait speed and grip strength in predicting 10-year cognitive decline among community-dwelling older people. BMC Geriatr. 2019;19(1):186. doi:10.1186/s12877-019-1199-7 [PubMed: 31277579]
6. Bullain SS, Corrada MM, Perry SM, Kawas CH. Sound body sound mind? Physical performance and the risk of dementia in the oldest-old: The 90+ Study. J Am Geriatr Soc. 2016;64(7):1408–1415. doi:10.1111/jgs.14224 [PubMed: 27377238]
7. Peters DM, Fritz SL, Krotish DE. Assessing the reliability and validity of a shorter walk test compared with the 10-Meter Walk Test for measurements of gait speed in healthy, older adults. J Geriatr Phys Ther. 2013;36(1):24–30. doi:10.1519/JPT.0b013e318248e20d [PubMed: 22415358]
8. Unver B, Baris RH, Yuksel E, Cekmece S, Kalkan S, Karatosun V. Reliability of 4-meter and 10-meter walk tests after lower extremity surgery. Disabil Rehabil. 2017;39(25):2572–2576. doi:10.1080/09638288.2016.1236153 [PubMed: 27728985]
9. Bloem AEM, Veltkamp M, Spruit MA, et al. Validation of 4-meter-gait-speed test and 5-repetitions-sit-to-stand test in patients with pulmonary fbrosis: A clinimetric validation study. Sarcoidosis Vasc Diffus Lung Dis. 2018;35(4):317–326. doi:10.36141/svdld.v35i4.7035
10. Bohannon RW, Wang YC. Four-meter gait speed: normative values and reliability determined for adults participating in the NIH Toolbox Study. Arch Phys Med Rehabil. 2019;100(3):509–513. doi:10.1016/j.apmr.2018.06.031 [PubMed: 30092204]
11. Bergland A, Strand BH. Norwegian reference values for the Short Physical Performance Battery (SPPB): The Tromsø Study. BMC Geriatr. 2019;19(1):216. doi:10.1186/s12877-019-1234-8 [PubMed: 31395008]
12. Thaweewannakij T Reference values of physical performance in Thai elderly people who are functioning well and dwelling in the community. Phys Ther. 2013;93(10):1312–1320. doi:10.1111/j.1467-9639.1992.tb00206.x [PubMed: 23620530]
13. Bohannon RW, Williams Andrews A. Normal walking speed: A descriptive meta-analysis. Physiotherapy. 2011;97(3):182–189. doi:10.1016/j.physio.2010.12.004 [PubMed: 21820535]

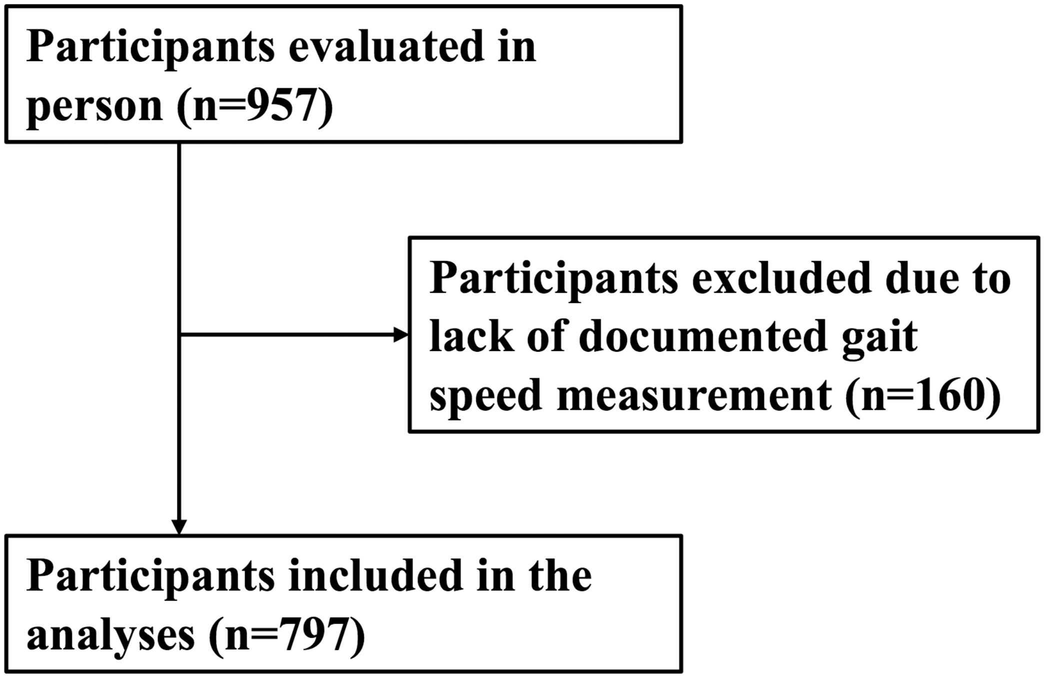

Figure 1.

Flowchart of participant selection process. Participants were excluded if gait speed was not documented.

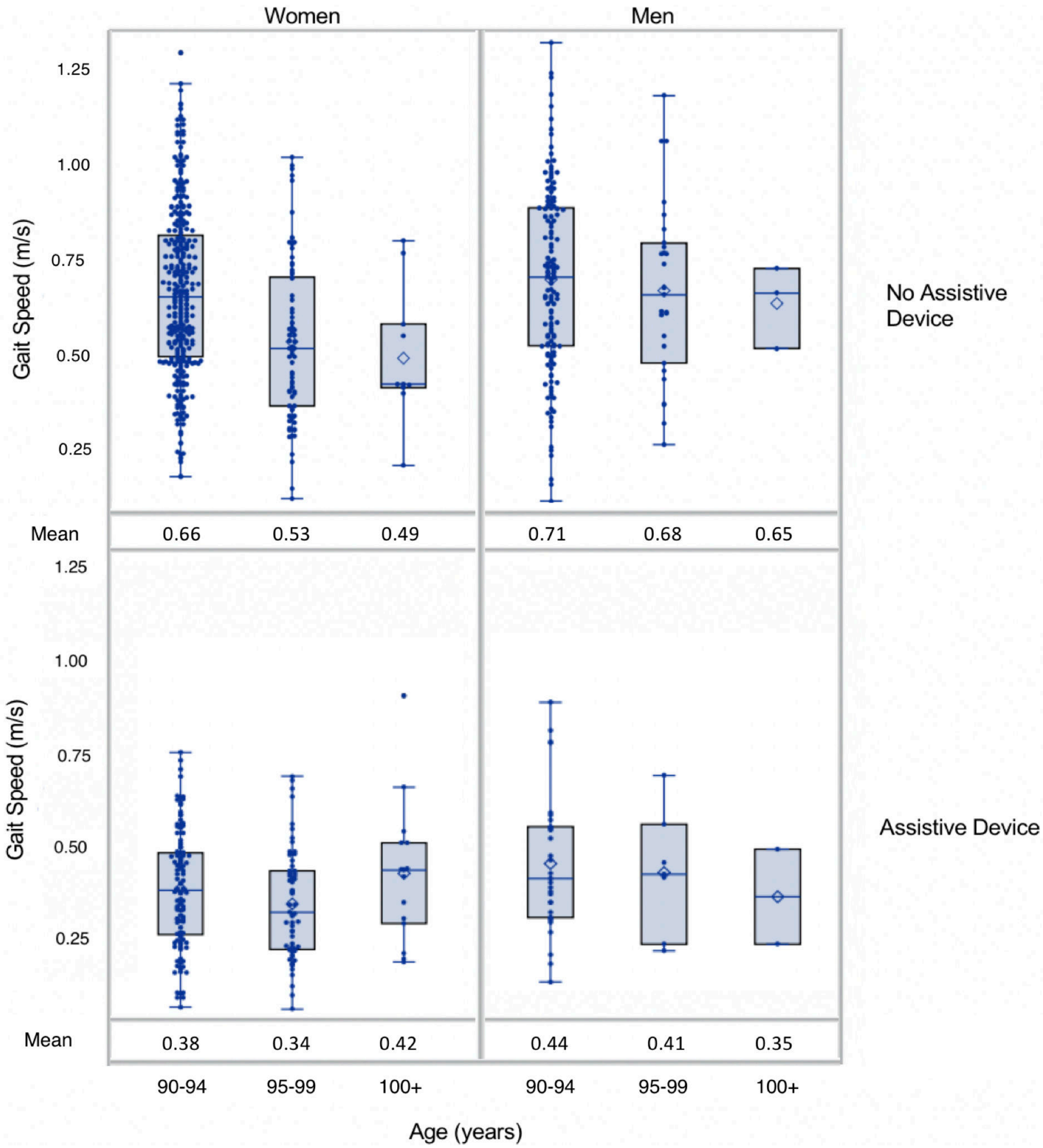

Figure 2.

Boxplot of gait speed (m/s) stratified by age, sex, and use of assistive device (n=797). Abbreviations: m/s, meters per second.

Table 1.

Background characteristics of study participants by sex and age in years[a] (n=797)

Women				
Characteristic	**Overall (n=588)**	**90–94 (n=424)**	**95–99 (n=138)**	**100+ (n=26)**
Mean age (SD), years	93.6 (2.8)	92.2 (1.4)	96.6 (1.3)	101.2 (1.0)
Race and ethnicity, n (%)				
Asian/Pacific Islander	2 (0.3)	1 (0.2)	1 (0.7)	-
Black	1 (0.2)	1 (0.2)	-	-
Hispanic/Latino	3 (0.5)	-	3 (2.2)	-
White	580 (99.0)	422 (99.5)	132 (97.1)	26 (100.0)
Educational level, n (%)				
≤ High school	171 (29.2)	121 (28.6)	40 (29.2)	10 (38.5)
Vocational school or some college	220 (37.5)	164 (38.8)	50 (36.5)	6 (23.1)
≥College degree	195 (33.3)	138 (32.6)	47 (34.3)	10 (38.5)
Living situation, n (%)				
Alone	316 (53.7)	264 (62.3)	47 (36.1)	5(19.2)
At home with family or caregiver	148 (25.2)	100 (23.6)	41 (29.7)	7(26.9)
Assisted living	105 (17.9)	48 (11.3)	46 (33.3)	11(42.3)
Nursing home	18 (3.1)	12 (2.8)	4 (2.9)	3 (11.5)
Chronic Disease, n (%)				
Hypertension	308 (59.1)	251 (60.5)	78 (57.4)	11 (44.0)
Cardiovascular disease[b]	236 (40.6)	174 (41.2)	48 (35.6)	14 (56.0)
Cerebrovascular disease[c]	131 (23.2)	90 (22.0)	35 (26.7)	6 (25.0)
Diabetes Mellitus	41 (7.0)	30 (7.1)	7 (5.2)	4 (16.0)
Osteoarthritis	282 (49.7)	194 (47.6)	77 (56.6)	11 (45.8)
Dementia	142 (25.6)	77 (19.3)	53 (41.1)	12 (48.0)
Assistive device use, n (%)[d]				
No	398 (67.7)	312 (73.6)	75 (54.4)	11 (42.3)
Yes	190 (32.3)	112 (26.4)	63 (45.7)	15 (57.7)
Falls in the past year, n (%)				
0	324 (55.4)	242 (57.4)	69 (50.0)	13 (52.0)
1+	261 (44.6)	180 (42.7)	69 (50.0)	12 (48.0)
Men				
Characteristic	**Overall (n=209)**	**90–94 (n=170)**	**95–99 (n=34)**	**100+ (n=5)**
Mean age (SD), years	93.2 (2.5)	92.3 (1.5)	96.6 (1.4)	101.1 (1.1)
Race and ethnicity, n (%)				
Asian/Pacific Islander	1 (.5)	1 (0.6)	-	-
Black	-	-	-	-
Hispanic/Latino	4 (1.9)	4 (2.4)	-	-

White	204 (97.6)	165 (97.1)	34 (100.0)	5 (100.0)
Educational level, n (%)				
≤ High school	44 (21.1)	37(21.8)	7(20.6)	-
Vocational school or some college	46 (22.0)	41(24.1)	4(11.8)	1(20.0)
≥College degree	119 (56.9)	92(54.1)	23(67.7)	4(80.0)
Living situation, n (%)				
Alone	82 (39.2)	68 (40.0)	13 (38.2)	1 (20.0)
At home with family or caregiver	104 (49.8)	81 (47.6)	19 (55.9)	4 (80.0)
Assisted living	21 (10.0)	19 (11.2)	2(5.9)	-
Nursing home	2 (1.0)	2 (1.2)	-	-
Chronic Disease, n (%)				
Hypertension	98 (47.6)	83 (49.7)	13 (38.2)	2 (40.0)
Cardiovascular disease[b]	128 (61.2)	102 (60.0)	24 (70.6)	2 (40.0)
Cerebrovascular disease[c]	47 (23.0)	34 (20.6)	10 (29.4)	3 (60.0)
Diabetes Mellitus	20 (9.6)	19 (11.2)	1 (2.9)	-
Osteoarthritis	57 (28.6)	45 (27.8)	9 (28.1)	3 (60.0)
Dementia	27 (13.5)	24 (14.8)	3 (9.1)	-
Assistive device use, n (%)[d]				
No	169 (80.9)	139 (81.8)	27 (79.4)	3 (60.0)
Yes	40 (19.1)	31 (18.2)	7 (20.6)	2 (40.0)
Falls in the past year, n (%)				
0	117 (56.0)	101 (59.4)	15 (44.1)	1 (20.0)
1+	92 (44.0)	69 (40.6)	19 (55.9)	4 (80.0)

[a]Number of missing values for race=2, educational level=2, hypertension=15, cardiovascular disease=6, cerebrovascular disease=44, diabetes mellitus=6, osteoarthritis=30, dementia=43, falls=3.

[b]Cardiovascular disease was defined as a history of coronary artery disease, myocardial infarction, atrial fibrillation and other arrhythmias, heart valve disease, congestive heart failure, pacemaker, or coronary artery bypass graft.

[c]Cerebrovascular disease was defined as a history of stroke or transient ischemic attack.

[d]Assistive devices included canes and walkers.

Table 2.

Reference values for usual gait speed, in meters per second (m/s), in women according to age and use of assistive device[a] (n=588)

Age (years)	N	Mean	SD	P5	P10	P25	P50	P75	P90	P95
No Assistive Device										
90–94	312	0.66	0.23	0.32	0.38	0.49	0.65	0.82	0.96	1.06
95–99	75	0.53	0.22	0.23	0.29	0.36	0.51	0.70	0.81	0.97
100+	11	0.49	0.18	0.20	0.39	0.41	0.42	0.58	0.77	0.80
Overall	398	0.63	0.23	0.29	0.34	0.47	0.61	0.80	0.95	1.03
Assistive Device										
90–94	112	0.38	0.17	0.09	0.16	0.25	0.38	0.48	0.60	0.64
95–99	63	0.34	0.15	0.14	0.16	0.21	0.31	0.43	0.52	0.64
100+	15	0.42	0.20	0.17	0.18	0.28	0.43	0.51	0.67	0.93
Overall	190	0.37	0.17	0.14	0.17	0.23	0.37	0.48	0.59	0.64
All Women										
90–94	424	0.59	0.25	0.21	0.28	0.42	0.57	0.76	0.92	1.02
95–99	138	0.44	0.21	0.15	0.19	0.29	0.41	0.56	0.74	0.81
100+	26	0.45	0.19	0.18	0.20	0.34	0.42	0.54	0.77	0.80
Overall	588	0.55	0.24	0.18	0.23	0.37	0.52	0.72	0.89	0.99

[a]Assistive devices used included canes and walkers.

P5=5th percentile, P10=10th percentile, P25=25th percentile, P50=50th percentile, P75=75th percentile, P90= 90th percentile, P95=95th percentile.

Table 3.

Reference values for usual gait speed, in meters per second (m/s), in men according to age and use of assistive device[a] (n=209)

Age (years)	N	Mean	SD	P5	P10	P25	P50	P75	P90	P95
No Assistive Device										
90–94	139	0.71	0.24	0.32	0.40	0.54	0.72	0.90	1.00	1.10
95–99	27	0.68	0.23	0.33	0.38	0.49	0.67	0.81	1.08	1.08
100+	3	0.65	0.11	0.53	0.53	0.53	0.67	0.74	0.74	0.74
Overall	169	0.71	0.24	0.33	0.40	0.54	0.71	0.88	1.00	1.09
Assistive Device										
90–94	31	0.44	0.19	0.16	0.25	0.29	0.40	0.54	0.77	0.80
95–99	7	0.41	0.17	0.20	0.20	0.22	0.41	0.55	0.68	0.68
100+	2	0.35	0.19	0.22	0.22	0.22	0.35	0.48	0.48	0.48
Overall	40	0.43	0.18	0.17	0.21	0.29	0.41	0.54	0.73	0.79
All Men										
90–94	170	0.66	0.26	0.26	0.33	0.49	0.66	0.87	0.99	1.06
95–99	34	0.63	0.25	0.22	0.33	0.44	0.62	0.78	0.91	1.08
100+	5	0.53	0.20	0.22	0.22	0.48	0.53	0.68	0.74	0.74
Overall	209	0.65	0.25	0.25	0.33	0.47	0.65	0.84	0.99	1.08

[a]Assistive devices used included canes and walkers.

P5=5th percentile, P10=10th percentile, P25=25th percentile, P50=50th percentile, P75=75th percentile, P90= 90th percentile, P95=95th percentile.