Published in final edited form as:

J Stroke Cerebrovasc Dis. 2014 January ; 23(1): . doi:10.1016/j.jstrokecerebrovasdis.2012.11.003.

The Short Physical Performance Battery as a Predictor of Functional Capacity after Stroke

Alyssa D. Stookey, PhD^{*}, Leslie I. Katzel, MD, PhD^{*,†}, Gregory Steinbrenner, MS^{*,†}, Marianne Shaughnessy, PhD^{*,†}, and Frederick M. Ivey, PhD^{*,‡}

^{*}Department of Veterans Affairs and Veterans Affairs Medical Center, Geriatric Research, Education and Clinical Center (GRECC) [†]Departments of Medicine, University of Maryland School of Medicine, Baltimore, Maryland. [‡]Departments of Neurology, University of Maryland School of Medicine, Baltimore, Maryland.

Abstract

Background—The short physical performance battery is a widely used instrument for quantifying lower extremity function in older adults. However, its utility for predicting endurance-based measures of functional performance that are more difficult to conduct in clinical settings is unknown. An understanding of this could be particularly relevant in mobility impaired stroke survivors, for whom establishing the predictive strength of simpler to perform measures would aid in tracking broader categories of functional disability. This cross-sectional study was conducted to determine whether the short physical performance battery is related to functional measures with a strong endurance component.

Methods—Functional measures (short physical performance battery, peak aerobic capacity, and 6-minute walk) were obtained and compared for the first time in stroke survivors with hemiparetic gait. Pearson correlation coefficients were used to assess strength of the relationships ($\alpha P < .05$).

Results—Forty-three stroke participants performed a standardized short physical performance battery. Forty-one of the subjects completed a 6-minute walk, and 40 completed a peak treadmill test. Mean short physical performance battery (6.3 ± 2.5 [mean $\pm$ SD]), 6-minute walk (242 ± 115 meters), and peak aerobic capacity (17.4 ± 5.4 mL/kg/min) indicated subjects had moderate to severely impaired lower extremity functional performance. The short physical performance battery was related to both 6-minute walk ($r = 0.76$; $P < .0001$) and peak fitness ($r = 0.52$; $P < .001$).

Conclusions—Our results show that the short physical performance battery may be reflective of endurance-based, longer-distance performance measures that would be difficult to perform in standard clinical stroke settings. Additional studies are needed to explore the value of using the short physical performance battery to assess rehabilitation-related functional progression after stroke.

Keywords

Exercise; rehabilitation; stroke recovery

Effectively tracking the long-term progression of lower extremity function after stroke is challenging but essential, considering the high prevalence of this condition and the degree to

which stroke-related deficits compound over time secondary to physical inactivity.^{1,2} The majority of survivors are left with residual neurologic deficits that impair both function and mobility,³ such that clinicians in the field would benefit from having predictive instruments that adequately capture diverse aspects of disability progression/regression. However, many functional tests are impractical in routine clinical settings because of a number of factors. For example, treadmill peak aerobic capacity (VO₂ peak) is considered the criterion standard measure of functional performance for aging and disabled populations,^{4,5} but wide-spread use in stroke clinical practice would be limited by constraints related to time, equipment, and expertise. Similarly, the 6-minute walk (6MW) test is a broadly recognized functional performance outcome for long distance, community-based ambulation,⁶ but can be difficult to perform because of the extensive amount of floor space required. Establishing easier to use surrogate measures that are related to endurance-based functional capacity after stroke would therefore be clinically relevant.

The short physical performance battery (SPPB)—a brief performance battery based on a timed short distance walk, repeated chair stands, and a set of balance tests—is a validated assessment tool for measuring lower extremity function that is widely used in both clinical and research settings.⁷⁻¹⁴ The popularity of this instrument stems, in part, from its relative ease of use, perceived potential for implementation in clinical practice, and good association with physical activity levels and general walking disability in nortstroke elderly.⁷⁻¹⁰ It has also been found to predict mortality,^{9,11} hospitalization rate,^{11,12} and a variety of comorbid disease conditions.^{13,14} Nevertheless, little is known about this measure in the context of stroke recovery and rehabilitation. In addition, it is entirely unknown whether SPPB scores reflect endurance capacity during longer-distance ambulatory functional tests in this population.

Our study sought to clarify the clinical utility of the SPPB for functional performance measures that more closely mimic the endurance and distance requirements of community-based ambulation. Specifically, we obtained results from SPPB, VO₂ peak, and 6MW in a cohort of hemiparetic stroke patients for the purpose of characterizing the relationship of SPPB with these indices of functional performance.

Methods

Subjects

This study was approved by the institutional review board of the University of Maryland, and all subjects provided written informed consent. Community dwelling stroke patients between 40 and 87 years of age with residual mild to moderate hemiparetic gait were recruited from the University of Maryland Medical System, the Baltimore Veterans Affairs Maryland Health Care System, and the surrounding greater Baltimore area for ongoing exercise rehabilitation studies. Mild to moderate hemiparetic gait was defined as observable asymmetry of gait including reduced stance time, or reduced stance and increased swing time in the affected limb. Participants had preserved capacity for ambulation with an assistive device (e.g., a walker or cane) and/or a standby aid, as needed. Participants were required to have completed all conventional inpatient and outpatient physical therapy and were >6 months (ischemic stroke) or 12 months (hemorrhagic stroke) after the index stroke date.

All participants underwent evaluations for eligibility, including a comprehensive history and physical examination, a neurologic examination by a neurologist or nurse practitioner, and a graded exercise test with electrocardio-graphic monitoring. The intent was to enroll each subject into an exercise interventional study. Exclusion criteria were established to ensure participant safety for exercise participation and included any chronic medical condition that

would be a contraindication to exercise, such as cardiac history of unstable angina, recent (<3 months) myocardial infarct, congestive heart failure (New York Heart Association category II-IV), hemodynamically significant valvular dysfunction, a medical history of peripheral arterial occlusive disease with claudication, pulmonary or renal failure, active cancer, untreated or poorly controlled hypertension measured on at least 2 occasions (>160/100 mm Hg), poorly controlled diabetes (HbA1c >10%), or anemia (hematocrit <30). Participants were also excluded if they met the screening criteria consistent with dementia (Mini-Mental Status Examination [MMSE] score <23), symptomatic angina, or severe silent myocardial ischemia (>2 mm ST segment depression on the exercise treadmill test), or had current, untreated major depression (Center for Epidemiological Studies–Depression [CESD] scale score >16).

Short Physical Performance Battery

The SPPB is a functional test that measures gait speed (8-foot walk), standing balance, and lower extremity strength and endurance (chair rise task). During the 8-foot walk, participants were instructed to walk at their normal comfortable pace over a flat, 8-foot walking surface demarcated by traffic cones. The average of 3 trials was used. For safety, participants wore a gait belt and used their assistive device and/or orthoses. Standing balance was assessed for 3 different static positions: feet side by side, semitandem (side of the heel of 1 foot touching the big toe of the other), and full tandem (heel of 1 foot in front of and touching the toes of the other foot). Participants were instructed to try to hold each of these positions for 10 seconds. For the chair rise task, participants were instructed to stand up and sit down 5 times in a row as quickly as possible. Each test was scored on a scale of 0 to 4 points, with a summary performance score range of 0 to 12 points using cutpoint criteria established by Guralnik et al.⁹ If the participant was unable to perform a specific test, a score of a 0 was assigned. A cumulative score for each measure was then tallied to derive a total SPPB summary score.

6-Minute Walk

The 6MW is a distance that is more representative of community-based activities of daily living (ADL) tasks and is commonly used to assess function in patients with chronic disease. Standard administration procedures outlined by Enright⁶ were followed. Participants were instructed to cover as much distance as they could, in 6 minutes, over a flat, 100-foot walking surface demarcated by traffic cones. For safety, they wore a gait belt and used their assistive device and/or orthoses.

VO₂ Peak

Participants underwent a physician-supervised screening treadmill test to ascertain safety and tolerance of graded exercise testing and to facilitate acclimatization.⁴ On a subsequent visit, VO₂ peak was measured by open circuit spirometry (Quark Cardio Pulmonary Exercise Testing Metabolic Analyzer; Cosmed, Rome, Italy) during a constant velocity, progressively graded treadmill test to the point of volitional fatigue.⁴ The target velocity for the treadmill test was based upon a percentage of the subject's self-selected floor walking speed as determined by a 30-foot walk. The first stage was 2 minutes in duration with a 0% grade; the second stage was 2 minutes in duration at a 4% grade. For all subsequent stages, the grade was increased by 2% every minute until voluntary fatigue. A modified protocol was used in more disabled individuals, during which subjects walked at a 2% grade instead of 4% during the second stage. Oxygen consumption and CO₂ production was measured breath by breath. VO₂ peak was calculated based on the average of the last minute during the final stage of the test.

Data Analysis

Data were analyzed using SPSS software (version 18.0; SPSS, Inc, Chicago, IL). All data are expressed as mean $\pm$ standard deviation with a 2-tailed P value of .05 required for significance. Pearson correlation coefficients quantified the strength of the relationships of SPPB to VO₂ peak and 6MW.

Results

Participant Characteristics

Forty-three subjects (30 men; 13 women) completed this cross-sectional study. Of those, 51% were African American and 42% were white (the remainder were Asian and Hispanic). Physical characteristics of the subjects are summarized in Table 1. The subjects had a high degree of lower extremity functional impairment in each of the 3 functional performance measures (SPPB, 6MW, and VO₂ peak; Table 1). Forty of the 43 patients had total SPPB scores <10, a commonly accepted threshold value for functional impairment,^{12,15} and 32 patients scored a 1 or 0 on the chair stand task. Finally, results from the MMSE and CESD indicate a group that was cognitively intact and not depressed.

SPPB versus VO₂ Peak

Using Pearson r values, the cumulative score on the SPPB was directly compared to VO₂ peak results from the treadmill test in the 40 participants for whom both functional measures were available. There was a significant correlation between these 2 measures as shown in Figure 1 ($r = 0.52$; $P < .001$; $n = 40$). Stroke participants with less functional aerobic impairment had higher SPPB scores. No obvious outliers contributed to artificially strengthening this apparent relationship. When controlling for age, the relationship between SPPB and VO₂ peak did not change appreciably ($r = .45$, $P < .01$). The relationships between each subcomponent of the SPPB and VO₂ peak are summarized in Table 2.

SPPB versus 6MW

The distance derived from the 6MW test was likewise compared to the cumulative SPPB score in Figure 2. This scatterplot depicts an even stronger relationship between these 2 functional performance measures ($r = 0.76$; $P < .001$; $n = 41$), indicating that long distance ambulatory capacity is well captured by the shorter performance battery among stroke participants. Stroke participants with better SPPB scores were also able to cover a greater distance during the 6MW test. When controlling for age, the correlation between total SPPB score and 6MW distance remains unchanged ($r = 0.76$; $P < .001$). The relationships between each subcomponent of the SPPB and 6MW are summarized in Table 2.

Discussion

This study is the first to establish how SPPB scores relate to more time- and resource-intensive measures of lower extremity functional performance in deconditioned, hemiparetic stroke participants. Before this study, the use of the SPPB to characterize disability after stroke had been limited, such that our SPPB data alone are useful for better understanding how disability in this population is ranked using this instrument. Importantly, we showed that SPPB is mildly to moderately associated with both 6MW and VO₂ peak after stroke, suggesting that SPPB has the potential in clinical practice to track longer-distance ambulatory capacity.

The SPPB was first established as a disability measure for older individuals by Guralnik et al.⁹ in 1994.⁹ Since then, the measure has become gradually more prominent in the aging literature, used in both cross-sectional and longitudinal studies involving healthy elderly and

some disability conditions.¹⁵⁻²⁰ In 2010, Vartzzana et al¹⁵, defined impaired mobility as a SPPB of <10. Guralnik et al⁷ classified individuals with a SPPB between 4 and 6 as having moderate limitations. On that basis, our cohort of 43 stroke survivors with a mean SPPB of 6.5 might be described as substantively impaired. Our group was slightly more impaired according to SPPB than the group of stroke patients studied by Westlake and Patten¹⁸ (mean 7.4; n = 16) and slightly less impaired than a group of Italian stroke subjects in a study by Stuart et al¹⁹ (SPPB 5.8; n = 78). However, SPPB values in the 3 studies using stroke participants have been confined, on average, to a fairly narrow 1.6-point range, indicating an emerging and consistent poststroke disability according to this scale.^{18,19} Neither of the other 2 stroke studies using SPPB assessed the association between it and other measures of functional performance (VO₂ peak and 6MW), making the current study unique in its contribution to the literature. To our knowledge, no such comparisons have ever been made in rionstroke participants.

Peak cardiovascular fitness levels in stroke survivors are only half those found in age- and sex-matched sedentary nonstroke controls,²⁰⁻²³ resulting in a condition referred to as functional aerobic impairment. Specifically, stroke survivors' VO₂ peak levels extend only to the middle of the ADL range,²³ making middle to upper level ADLs virtually impossible and rendering lower-level ADLs unsustainable for any extended period of time. Although the cohort studied in this particular study had slightly higher VO₂ peak than the whole of our hemiparetic stroke population studied over the past 15 years, 50% of the subjects in this study would still be identified as having cardiovascular disability on the basis of VO₂ peak being <5 metabolic equivalents (17.5 mL/kg/min).²⁴ The expertise required for conducting these treadmill tests is likely prohibitive for considering this test as a means for repeatedly tracking stroke/disability progression.

The 6MW test has become a useful tool in capturing long distance ambulation and has been used more extensively in the stroke literature to characterize disability. Fulk et al²⁵ concluded that the 6MW test was a clinically reliable (intraclass correlation coefficient 0.973 [95% confidence interval 0.925-0.988]) measure to determine walking ability in stroke survivors. In addition, the 6MW has shown to be a distance most representative of community-based ambulatory capacity and a sensitive outcome measure in stroke survivors.²⁶ The 6MW distances of healthy subjects range between 400 and 700 meters.²⁷⁻²⁹ The stroke literature highlights the significant walking impairment in stroke survivors with documented 6MW distances ranging from 116 to 341 meters,³⁰⁻³⁵ averaging 49.8% the distance of their healthy counterparts.³⁶ Our cohort of 43 stroke survivors, with a mean 6MW distance of 242 meters, would be described as substantively impaired. Based on the existing literature, our stroke survivors were able to cover a distance typical of most individuals poststroke, being right in the middle of the range of distances reported. The 6MW, although easier to conduct than treadmill VO₂ peak testing, still has some features that make it an unlikely candidate for wide-spread use in clinic. Therefore, easier to perform surrogate measures that are reflective of long distance ambulation are needed by stroke health care professionals. Before the current study, no work was available to gauge how well SPPB predicts 6MW results after stroke.

In summary, our work is the first to show that SPPB is moderately associated with harder to conduct measures of long distance ambulatory function in chronic stroke. The results are limited by a relatively small sample size and a disability level that is slightly less severe than previously studied stroke cohorts at our center. Although our work illustrates that SPPB, VO₂ peak, and 6MW are all interrelated, at this time all 3 measures should be used to fully quantify disability in stroke patients. Future work will require larger samples with a broader range of disability before definitive conclusions can be drawn regarding the utility of SPPB for predicting VO₂ peak and 6MW.

Acknowledgments

Supported by a Veterans Affairs (VA) RR&D CDA-1 Award (Dr. Stookey), Department of VA and VA Medical Center, Geriatric Research, Education and Clinical Center (GRECC), The National Institute on Aging (NIA) Claude D. Pepper Older Americans Independence Center (P30-AG028747), and the Department of VA, VA RR & D Exercise & Robotics Center of Excellence. Dr. Ivey was supported by VA Merit Award funding.

References

1. Gresham GE, Fitzpatrick TE, Wolf PA, et al. Residual disability in survivors of stroke—The Framingham Study. *N Engl J Med*. 1975; 293:954–956. [PubMed: 1178004]
2. Potempa K, Lopez M, Brau L, et al. Physiological outcomes of aerobic exercise training in hemiparetic stroke patients. *Stroke*. 1995; 26:101–105. [PubMed: 7839377]
3. Lloyd-jones D, Adams Rf, Camethon M, et al. Heart disease and stroke statistics—2009 update. A report from the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. *Circulation*. 2009; 119:e21–e181. [PubMed: 19075105]
4. Macko RF, Katzell LI, Yataco A, et al. Low-velocity graded treadmill stress testing in hemiparetic stroke patients. *Stroke*. 1997; 28:988–992. [PubMed: 9158639]
5. Dobrovolsky CL, Ivey FM, Rogers MA, et al. Reliability of treadmill exercise testing in older patients with chronic hemiparetic stroke. *Arch Phys Med Rehabil*. 2003; 84:1308–1312. [PubMed: 13680566]
6. Enright PL. The six-minute walk test. *Respir Care*. 2003; 48:783–785. [PubMed: 12890299]
7. Guralnik JM, Ferrucci L, Simonsick EM, et al. Lower-extremity function in persons over the age of 70 years as a predictor of subsequent disability. *N Engl J Med*. 1995; 332:556–561.
8. Guralnik JM, Ferrucci L, Pieper CF, et al. Lower extremity function and subsequent disability: Consistency across studies, predictive models, and value of gait speed alone compared with the short physical performance battery. *J Gerontol A Biol Sci Med Sci*. 2000; 55:M221–M231. [PubMed: 10811152]
9. Guralnik Simonsick EM, Ferrucci L, et al. A short physical performance battery assessing lower extremity function: Association with self-reported disability and prediction of mortality and nursing home admission. *J Gerontol*. 1994; 42:M85–M94.
10. Chang M, Cohen-Mansfield J, Ferrucci L, et al. Incidence of loss of ability to walk 400 meters in a functionally limited older population. *J Am Geriatr Soc*. 2004; 52:2094–2098. [PubMed: 15571549]
11. Volpato S, Cavalieri M, Sioulis F, et al. Predictive value of the short physical performance battery following hospitalization in older patients. *J Gerontol A Biol Sci Med Sci*. 2011; 66:89–96. [PubMed: 20861145]
12. Gaweł J, Vengrow D, Collins J, et al. The short physical performance battery as a predictor for long term disability or institutionalization in the community dwelling population aged 65 years old or older. *Phys Therapy Rev*. 2012; 17:37–44.
13. Choi HC, Son KY, Cho B, et al. An implication of the short physical performance battery (SPPB) as a predictor of abnormal pulmonary function in aging people. *Arch Gerontol Geriatr*. 2012; 54:448–452. [PubMed: 21511347]
14. Kaysen GA, Larive B, Painter P, et al. Baseline physical performance, health, and functioning of participants in the Frequent Hemodialysis Network (FHN) trial. *Am J Kidney Dis*. 2011; 57:101–112. [PubMed: 21184919]
15. Vazzana R, Bandinelli S, Lauretani F, et al. Trial Making Test predicts physical impairment and mortality in older persons. *J Am Geriatr Soc*. 2010; 58:719–723. [PubMed: 20398153]
16. Chiarantini D, Voipato S, Sioulis F, et al. Lower extremity performance measures predict long-term prognosis in older patients hospitalized for heart failure. *J Card Fail*. 2010; 16:390–395. [PubMed: 20447574]
17. Wennie Haung WN, Perera S, VanSwearingen J, et al. Performance measures predict onset of activity of daily living difficulty in community-dwelling older adults. *J Am Geriatr Soc*. 2010; 58:844–852. [PubMed: 20406319]

18. Westlake KP, Patten C. Pilot study of Lokomat versus manual-assisted treadmill training for locomotor recovery post-stroke. *J Neuroeng Rehabil.* 2009; 6:18.
19. Stuart M, Benvenuti F, Macko R, et al. Community-based adaptive physical activity program for chronic stroke: Feasibility, safety, and efficacy of the Empoli Model. *Neurorehabil Neural Repair.* 2009; 23:726–743. [PubMed: 19318465]
20. Corsonelio A, Lattanzio F, Pedone C, et al. Prognostic significance of the short physical performance battery in older patients discharged from acute care hospitals. *Rejuvenation Res.* 2012; 15:41–48. [PubMed: 22004280]
21. Potempa K, Lopez M, Braun LT, et al. Physiological outcomes of aerobic exercise training in hemiparetic stroke patients. *Stroke.* 1995; 26:101–105. [PubMed: 7839377]
22. Chu KS, Eng JJ, Dawson AS, et al. Water-based exercise for cardiovascular fitness in people with chronic stroke: A randomized controlled trial. *Arch Phys Med Rehabil.* 2004; 85:870–874. [PubMed: 15179638]
23. Ivey FM, Hafer-Macko CE, Makco RF. Exercise rehabilitation after stroke. *Neuro Rx.* 2003; 3:439–450. [PubMed: 17012057]
24. Freedom Disability web site. [Accessed March 23, 2012] Heart disease & other cardiovascular disabilities: Social Security disability. Available from <http://www.freedomdisability.com/social-security-disability-heart-disease-other-cardiovascular-disabilities/>
25. Fulk GD, Echternach JL, Nof L, et al. Clinometric properties of the six-minute walk test in individuals undergoing rehabilitation poststroke. *Physiother Theory Pract.* 2008; 24:195–204. [PubMed: 18569856]
26. Guyatt GH, Sullivan MJ, Thompson PJ, et al. The 6-minute walk: A new measure of exercise capacity in patients with chronic heart failure. *Can Med Assoc J.* 1985; 132:919–923. [PubMed: 3978515]
27. Enright PL, McBurnie MA, Bittner V, et al. The 6 minute walk test: A quick measure of functional status in elderly adults. *Chest.* 2003; 123:387–398. [PubMed: 12576356]
28. Enright PL, Sherrill DL. Reference equations for the six-minute walk in healthy adults. *Am J Respir Crit Care Med.* 1998; 158:1384–1387. [PubMed: 9817683]
29. Gibbons WJ, Fruchter N, Sloan S, et al. Reference values for a multiple repetition 6-minute walk test in healthy adults older than 20 years. *J Cardiopulm Rehabil.* 2001; 21:87–93.
30. Patterson SL, Forrester LW, Rodger MM, et al. Determinants of walking function after stroke: Differences by deficit severity. *Arch Phys Med Rehabil.* 2007; 88:115–119. [PubMed: 17207686]
31. Duncan R, Richards L, Wallace D, et al. A randomized, controlled pilot study of a home-based exercise program for individuals with mild and moderate stroke. *Stroke.* 1998; 29:2055–2060. [PubMed: 9756581]
32. Tang A, Sibley KM, Bayley MT, et al. Do functional walk tests reflect cardiorespiratory fitness in sub-acute stroke? *J Neuroeng Rehabil.* 2006; 29:23. [PubMed: 17010203]
33. Eng JJ, Chu KS, Dawson AS, et al. Functional walk tests in individuals with stroke: Relation to perceived exertion and myocardial exertion. *Stroke.* 2002; 33:756–761. [PubMed: 11872900]
34. Micheal K, Goldberg AP, Trueth MS, et al. Progressive adaptive physical activity in stroke improves balance, gait, and fitness: Preliminary results. *Top Stroke Rehabil.* 2009; 16:133–139. [PubMed: 19581199]
35. Pohl PS, Duncan PW, Perera S, et al. Influence of stroke-related impairments on performance in 6-minute walk test. *J Rehabil Res Dev.* 2002; 39:439–444. [PubMed: 17638141]
36. Dean CM, Richards CL, Malouin F. Walking speed over 10 metres overestimates locomotor capacity after stroke. *Clin Rehabil.* 2001; 15:415–421. [PubMed: 11518442]

Figure 1.
Relationship between peak oxygen consumption during a graded exercise test and total score on the short physical performance battery.

Figure 2.
Relationship between the distance covered during the 6-minute walk and total score on the short physical performance battery.

Table 1

Subject demographics and physical performance measures

Variable	N	Mean $\pm$ SD	Range
Age, y	43	61.5 $\pm$ 9.8	43-87
Height, cm	43	171 $\pm$ 8.4	154-188
Weight, kg	43	82.5 $\pm$ 21.8	48.7-155.7
Body mass index, kg/m ²	43	28.0 $\pm$ 6	18.6-47.5
MMSE	43	28.4 $\pm$ 2.3	20-30
CESD	42	10.1 $\pm$ 8.9	0-31
Short physical performance battery	43	6.3 $\pm$ 2.5	3-12
6-min walk distance, meters	41	242 $\pm$ 115	75-544
VO ₂ peak, mL/kg/min	40	17.4 $\pm$ 5.4	7.1-27.9

Abbreviations: CESD, Center for Epidemiological Studies–Depression; MMSE, Mini-Mental Status Examination; SD, standard deviation; VO₂, aerobic capacity.

Table 2

Correlation between subcomponents of the short physical performance battery and functional measures

	Subcomponents of SPPB			
	Timed 8-ft walk	Standing balance	Chair rise	Total SPPB
VO ₂ peak				
Pearson correlation	0.42 [*]	0.36 [†]	0.37 [†]	0.52 [*]
<i>P</i> value	.007	.023	.018	.00
6MW time				
Pearson correlation	0.74 [*]	0.27	0.64 [*]	0.76 [*]
<i>P</i> value	.000	.09	.000	.001

Abbreviations: 6MW, 6-minute walk; SPPB, short physical performance battery; VO₂, aerobic capacity.

* Correlation significant at the .01 level (2-tailed).

[†] Correlation significant at the .05 level (2-tailed).