

ORGANIZATION NEWS

Highlights From the Rehabilitation Measures Database

This content is provided as a service by the American Congress of Rehabilitation Medicine and is not peer reviewed by the Archives.

Measurement Characteristics and Clinical Utility of the Short Physical Performance Battery Among Community-Dwelling Older Adults

Andrea W. Westman, PT, DPT, Stephanie Combs-Miller, PT, PhD, NCS,
Jennifer Moore, PT, DHS, NCS, Linda Ehrlich-Jones, PhD, RN

With the continued population increase of adults aged 65 and older, it is imperative to ensure that older adults are able to maintain their independence as long as possible.¹ Maintenance of physical function is central to preserving independence for older adults because declines in physical function result in the loss of mobility and activities of daily living.¹ Early detection of decline in physical function in older adults is critical and allows for early interventions to improve function or prevent further decline.² The Short Physical Performance Battery (SPPB) is a clinician-rated physical performance measure that evaluates physical function in older adults. This assessment consists of 3 subscales: standing balance, gait, and rising from a chair.² The assessment is scored on a 0-12 scale, with higher scores indicating better function.³ The SPPB does not require any formal training, is free to use, and requires only a stopwatch and chair. Psychometric studies of the SPPB have demonstrated excellent test-retest reliability,^{2,4-6} predictive validity,⁷ and convergent validity with the Nagi Disability Scale.⁵ Information is available to support using the test results in clinical decision making including cutoff scores, standard error of measurement, minimum detectable change scores, and the minimum clinically important difference values.^{2,3,7}

This abbreviated summary provides a review of the psychometric properties of the SPPB in community-dwelling older adults. A full review of the SPPB and reviews of more than 400 other instruments for patients with various health conditions can be found at: www.sralab.org/rehabilitation-measures.

Please address correspondence to rehabmeasures@sralab.org.

This instrument summary is designed to facilitate the selection of outcome measures by clinicians. The information contained in this summary represents a sample of the peer-reviewed research available at the time of this summary's publication. The information contained in this summary does not constitute an endorsement of this instrument for clinical practice. The views expressed are those of the summary authors and do not represent those of authors' employers, instrument owner(s), the Archives of Physical Medicine and Rehabilitation, the Rehabilitation Measures Database, or the United States Department of Health and Human Services. The information contained in this summary has not been reviewed externally.

The Rehabilitation Measures Database and Instrument Summary Tear-sheets were initially *funded* by the National Institute on Disability, Independent Living, and Rehabilitation Research, United States Department of Health and Human Services, through the Rehabilitation Research and Training Center on Improving Measurement of Medical Rehabilitation Outcomes (H133B090024).

BIBLIOGRAPHY

1. Ip E, Church T, Rejeski W, et al. Physical activity increases gains in and prevents loss of physical function: results from the lifestyle interventions and independence for elders pilot study. *J Gerontol A Biol Sci Med Sci* 2013;68:426-32.
2. Olsen C, Bergland A. Reliability of the Norwegian version of the short physical performance battery in older people with and without dementia. *BMC Geriatrics* 2017;17:124.
3. Perera S, Mody S, Woodman R, Studenski S. Meaningful change and responsiveness in common physical performance measures in older adults. *J Am Geriatr Soc* 2006;54:743-9.
4. Freire A, Guerra R, Alvarado B, Guralnik J, Zunzunegui M. Validity and reliability of the short physical performance battery in two diverse older adult populations in Quebec and Brazil. *J Aging Health* 2012;24:863-78.
5. Gómez J, Curcio C, Alvarado B, Zunzunegui M, Guralnik J. Validity and reliability of the Short Physical Performance Battery (SPPB): a pilot study on mobility in the Colombian Andes. *Colombia Medi (Cali)* 2013;44:165-71.
6. Mangione K, Craik R, Tomlinson J, et al. Detectable changes in physical performance measures in elderly African Americans. *Phys Ther* 2010;90:921-7.

7. Pavasini R, Guralnik J, Campo G, et al. Short Physical Performance Battery and all-cause mortality: systematic review and meta-analysis. *BMC Med* 2016;14:215.
8. Sayers S, Guralnik J, Newman A, Brach J, Fielding R. Concordance and discordance between two measures of lower extremity function: 400 meter self-paced walk and SPPB. *Aging Clin Exp Res* 2006;18:100-6.
9. Vasunilashorn S, Coppin A, Guralnik J, et al. Use of the Short Physical Performance Battery Score to predict loss of ability to walk 400 meters: analysis from the InCHIANTI study. *J Gerontol A Biol Sci Med Sci* 2009;64:223-9.

	Measure Name: Short Physical Performance Battery		Acronym: SPPB	Summary Authors: A. Westman, S. Combs-Miller, J. Moore, & L. Ehrlich-Jones		Items: 5																								
	Populations Reviewed: Community dwelling older adults	Training Required: None	Admin Time: 10 minutes	Score: 0/12 (min/max)	Required Equipment: Chair, stopwatch																									
Purpose and Administration Instructions: The SPPB assesses physical function in older persons. There are three subscales in the SPPB: 1. Balance: Ability to stand for 10 sec with feet in 3 different positions (together side-by-side, semi-tandem, and tandem) 2. Gait speed test: Two timed trials of a 3-m or 4-m walk (fastest recorded) 3. Chair stand: Time to rise from a chair five times			Scoring Instructions: There are three balance subsets: 1. Side by side stand scored from 0-1 2. Semi-tandem stance scored from 0-1 3. Tandem stance scored from 0-2 Gait and chair subtests scored from 0-4, cut-off scores provided to categorize the score based on time to complete the task																											
Reliability: Test-retest Reliability <ul style="list-style-type: none"> Excellent test-retest reliability (Norwegian translation, ICC=0.92)² Excellent test-retest reliability (Quebec sample; ICC=.89)⁴ Excellent test-retest reliability (Brazil sample; ICC=.83)⁴ Excellent test-retest reliability (ICC=.87)⁵ Excellent test-retest reliability (ICC= .81)⁶ Internal Consistency: <ul style="list-style-type: none"> Poor (Cronbach’s alpha 0.63- 0.66²) 			Scoring Interpretation: Score of ≤10 indicates a mobility disability defined by the inability to walk 400 meters ⁹																											
Standard Error of Measurement: <ul style="list-style-type: none"> SEM = 1.42 pts³ SEM (Norwegian translation) = 0.68 pts² SEM = 1.2 pts⁶ 			Validity: Predictive validity: <ul style="list-style-type: none"> Scores of 7-9 (OR = 1.5), 4-6 (OR = 2.14), and 0-3 (OR = 3.25) were associated with progressively greater risk of all-cause mortality when compared to a score of 10-12⁷ Convergent validity: ⁵																											
Floor / Ceiling Effects: In high functioning older adults, a ceiling effect may occur ⁸			<table border="1"> <thead> <tr> <th>Nagi items</th> <th>Able SPPB total score (SD)</th> <th>Nagi item, difficult unable, PPB total score (SD)</th> <th>P value</th> </tr> </thead> <tbody> <tr> <td>Pulling or pushing a large object, such as a chair</td> <td>10.02 (1.36)</td> <td>9.22(2.57)</td> <td>0.015</td> </tr> <tr> <td>Bending, stooping or kneeling</td> <td>10.24 (1.27)</td> <td>9.28(2.32)</td> <td>0.003</td> </tr> <tr> <td>Carrying weight less than 5 kg, such as a bag of potatoes</td> <td>9.98(1.68)</td> <td>8.90(2.52)</td> <td>0.003</td> </tr> <tr> <td>Going up or down a flight of stairs of at least 10 steps without rest</td> <td>10.20 (1.40)</td> <td>9.00(2.43)</td> <td>0.000</td> </tr> <tr> <td>Walking 5 blocks (400 m)</td> <td>9.97(1.73)</td> <td>8.64 (2.52)</td> <td>0.001</td> </tr> </tbody> </table>				Nagi items	Able SPPB total score (SD)	Nagi item, difficult unable, PPB total score (SD)	P value	Pulling or pushing a large object, such as a chair	10.02 (1.36)	9.22(2.57)	0.015	Bending, stooping or kneeling	10.24 (1.27)	9.28(2.32)	0.003	Carrying weight less than 5 kg, such as a bag of potatoes	9.98(1.68)	8.90(2.52)	0.003	Going up or down a flight of stairs of at least 10 steps without rest	10.20 (1.40)	9.00(2.43)	0.000	Walking 5 blocks (400 m)	9.97(1.73)	8.64 (2.52)	0.001
Nagi items	Able SPPB total score (SD)	Nagi item, difficult unable, PPB total score (SD)	P value																											
Pulling or pushing a large object, such as a chair	10.02 (1.36)	9.22(2.57)	0.015																											
Bending, stooping or kneeling	10.24 (1.27)	9.28(2.32)	0.003																											
Carrying weight less than 5 kg, such as a bag of potatoes	9.98(1.68)	8.90(2.52)	0.003																											
Going up or down a flight of stairs of at least 10 steps without rest	10.20 (1.40)	9.00(2.43)	0.000																											
Walking 5 blocks (400 m)	9.97(1.73)	8.64 (2.52)	0.001																											
MCID: <ul style="list-style-type: none"> MCID (decline) with anchor of climbing one flight of stairs = 1.88 points³ MCID (decline) with anchor of walking one block = .99 points³ 			Abbreviations: ICC: Intraclass Correlation OR: Odds ratio SD: Standard Deviation Sec: Seconds																											
Professional Considerations <ul style="list-style-type: none"> SPPB may not be able to distinguish performance in high functioning patients The 400-m walk test may be a better test for high functioning patients⁸ 			Cut-off Criteria: <table border="1"> <thead> <tr> <th></th> <th>r</th> <th>ICC</th> </tr> </thead> <tbody> <tr> <td>Excellent</td> <td>≥ .6</td> <td>≥ .75</td> </tr> <tr> <td>Adequate</td> <td>.31-.59</td> <td>.40-.74</td> </tr> <tr> <td>Poor</td> <td>≤ .3</td> <td>< .4</td> </tr> </tbody> </table>					r	ICC	Excellent	≥ .6	≥ .75	Adequate	.31-.59	.40-.74	Poor	≤ .3	< .4												
	r	ICC																												
Excellent	≥ .6	≥ .75																												
Adequate	.31-.59	.40-.74																												
Poor	≤ .3	< .4																												