

Next Opportunity to Join: May 27 - June 26, 2025

HEALTH REPORT

LPL STUDY

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Summary:



MDS-UPDRS:

75



SPPB Score:

9



MoCA Score:

24



TUG Time:

16.23s



Grip Strength:

L: 21.3kg R: 19.3kg



dualTUG Time:

Time: 13.75s Difference: -2.48s



Fo8 Walk Test:

Time: 7.98s No. Steps: 20



400 m Walk time:

6:14



Blood Pressure:

Central: 112.5 / 72.5

Peripheral: 122.5 / 71.5



Body Composition:

BMI: 27.6 Body Fat: 33.1%

All of the interpretations below are summaries of data provided in the Full Reference Guide appended to the end of this Health Report. Any superscript will correspond to the reference cited in the Full Reference Guide.

Medical Disclaimer:

The information provided on this health report is for informational purposes only, and is not intended to be a substitute for professional medical advice. Please consult a licensed physician for medical advice, diagnosis and treatment.



MDS-UPDRS

Unified Parkinson's Disease Rating Scale

I. Mental

4

These scores are typical of an individual with slight mental impacts of PD. (1)

II. Daily
Living

25

These scores are typical of an individual with mild impacts of PD on daily life. (1)

III. Motor

40

These scores are typical of an individual with mild motor impacts of PD. (1)

IV. Complica
tions

6

Less than 25% of the day is spent in the OFF state and with dyskinesia. There is a slight effect on activities during the off state and dyskinesia impacts a slight amount of activities. (1)

Hoehn
& Yahr

1

Unilateral movement (tremors). (1)

UPDRS
Total

75

Mild impacts of PD. (1)



PDQ 39

Parkinson's Disease Questionnaire

Mobility

15

This score is typical of patients with a Hoehn and Yahr stage of 1. (6)

Activities
of Daily
Living

21

This score is typical of patients with a Hoehn and Yahr stage of 1. (6)

Emotional
Wellbeing

13

This score is typical of patients with a Hoehn and Yahr stage of 1. (6)

Stigma

6

This score is typical of patients with a Hoehn and Yahr stage of 1. (6)

Social
Support

Cognition

25

This score is typical of patients with a Hoehn and Yahr stage of 1. (6)

Communication

8

This score is typical of patients with a Hoehn and Yahr stage of 1. (6)

Bodily Discomfort

17

This score is typical of patients with a Hoehn and Yahr stage of 1. (6)

PDQ Summary

15

This score is typical of patients with a Hoehn and Yahr stage of 1. (6)



MoCA: Cognition

Montreal Cognitive Assessment

Score:

24

MoCA scores are used to screen for Mild Cognitive Impairment. Your score may indicate the presence of Mild Cognitive Impairment because it is below the cutoff point of 26. (7)



Grip Strength

Jamaar++ Digital Hand Dynamometer

Left Hand:
21.3kg

The average maximum grip strength (kg) for both hands by decade for males your age is 41.1 kg.

Right Hand:
19.3kg

Based on your maximum score you are below average for your age and sex. (34)



Figure of Eight Walk Test

Completion
Time:
7.98s

Your time is quicker than average for your age group. This may indicate you are in a lower risk category for falls in the next six months compared to an individual who completed the test in over 9.8 seconds. (25)

No. Steps:
20

Your step count may indicate you are in a higher risk category for falls in the next six months compared to an individual who is able to complete the test in less than or equal to 16 steps. (25)



Central Blood Pressure

Atcor Sphygmacore

Central
112.5 / 72.5

For a male of your age, the normal range for systolic central blood pressure is between 99 and 135. Your systolic central blood pressure is the top number displayed to the left. (15)

Peripheral
122.5 / 71.5

Your blood pressure was elevated, according to the ranges recommended by the American Heart Association. (12)

Central
Pulse
Pressure
40

The pulse pressure is the difference between systolic (heart contracting) and diastolic (heart relaxing) blood pressures. (12)

Central
Augmenta
tion Index
28.5

The central augmentation index is a measure of arterial stiffness and endothelium function. The higher the value the greater the stiffness and lower the endothelial function to manage vascular tone. (12)

Central
Reflection
Magnitude
69.5

The reflection magnitude quantifies the impact of arterial stiffness on the aortic valve. The higher the value, the greater the impact of arterial stiffness on the heart muscle. (12)



Short Physical Performance Battery

Balance

4

The balance score can range from 0-4. Higher scores indicate greater proficiency at three balance related tests (like standing feet together, or heel-to-toe). (21)

Gait Speed

4

The gait total score can range from 0-4. Higher scores indicate more rapid completion of a 4-meter walking course. (12)

Chair Stand

1

The chair stand score can range from 0-4. Higher scores indicate faster completion of five iterations of rising from and sitting in a chair. (12)

Total

9

Your total is an aggregate of the preceding sections. Your score may indicate risk of present and future frailty. (12)



Timed Up and Go

Time:

16.23s

Your time may indicate a higher chance of falling, because it is above 14 seconds. (27)

Your speed for the TUG assessment was 0.4 m/s.



Timed Up and Go (Dual Task)

Time:

13.75s

Your speed for the TUG Dual assessment was 0.4 m/s.

Difference:

-2.48s

The difference in speed between TUG and TUG Dual Task is <10% slower. Dual tasks do not significantly limit your walking ability. (30)



400 m Walk

Speed:

1.1 m/s

Your walking speed (> 1.0 m/s) across this test is associated with independent living and resilience to health issues. (34)



Depression Scale

Center for Epidemiological Studies

Score
15

This score indicates a lower probability of being diagnosed with clinical depression than those who score > 16. The CES-D does not diagnose depression. (40)



Profile of Social Support

Appraisal
15

This value represents the sense of support in regards to being able to connect with someone about your problems on a scale of 0-30. A low score represents low support and a high score represents high support. (41)

Belonging
16

This value represents the sense of support in regards to a sense of being able to do things with other people on a scale of 0-30. A low score represents low support and a high score represents high support. (41)

Tangible
11

This value represents the sense of support in regards to being able to receive actual help in times of need on a scale of 0-30. A low score represents low support and a high score represents high support. (41)

Self-Esteem
18

This value represents the sense of support in regards to comparing one's self to others on a scale of 0-30. A low score represents low support and a high score represents high support. (41)

Total
60

The ISEL is scores on a scale of 0-120. A low score indicates low total social support and a high score indicates high total social support. (41)



Profile of Mood States

Mood Questionnaire

Tension

1

Your tension total score can range from 0-24. Higher scores in this area add to a higher overall mood disturbance score. (43)

Anger

5

Your anger total score can range from 0-24. Higher scores in this area add to a higher overall mood disturbance score. (43)

Fatigue

9

Your fatigue total score can range from 0-20. Higher scores in this area add to a higher overall mood disturbance score. (43)

Depression

4

Your depression total score can range from 0-28. Higher scores in this area add to a higher overall mood disturbance score. (43)

Esteem-
Related
Affect

13

Your esteem-related-affect score can range from 0-24 and is reverse scored, meaning it is subtracted from your total mood score. (43)

Vigor

0

Your vigor score can range from 0-20 and is reverse scored, meaning it is subtracted from your mood disturbance score. (43)

Confusion

4

Your confusion score can range from 0-20. Higher scores in this area add to a higher overall mood disturbance score. (43)

Total Mood
Disturbance

10

Total mood disturbance is scored on a scale of -44 to 114. A low score indicates a more stable mood state. Higher scores indicate greater mood disturbance or psychological distress. (43)



Body Composition

InBody 770

Weight:
75.6kg

See your BMI score below for an assessment of your weight relative to your height and its interpretation.

Height
165.5cm

This is your height in centimeters. The InBody 770 machine requires your height in order to perform its calculations.

SMM
27.4

Lean body mass is helpful for mobility and metabolic health. Maintenance and improvement in lean body mass over time is associated with insulin sensitivity and blood sugar regulation. A decrease in lean mass over time is typical (approximately 1% per year after middle age) but this is highly modifiable with physical activity, specifically resistance type activity that elicits muscle fatigue, as well as diet, especially sufficient protein intake. (17)

% Muscle
Mass
50.6

Lean body mass includes skeletal muscle, organs, and blood. It has similar associations with mobility and metabolic health as skeletal muscle mass. (17)

% Body Fat
33.1%

It has been well established that excess body fat, leads to increased risk of cardiovascular disease, hypertension, stroke, and other morbidities. (17)

Visceral Fat
104.4%

Body fat, especially in the abdomen area, leads to increased risk of cardiovascular disease, hypertension, stroke, and other morbidities. (17)

BMI
27.6

A Body Mass Index in this range (25 - <30) is considered overweight by the CDC guidelines on BMI. (16)

BMR
1462

This represents the number of calories needed to maintain your current weight with no energy expenditure from physical activity. (17)

Right Arm
LBM %
82.7%

A value of 100% means that you have an average amount of lean mass in this body segment compared to your peers. Above 100% indicates extra lean mass and less than 100% indicates less lean mass compared to your peers. Lean mass is the mass of everything except fat tissue. (17)

Left Arm
LBM %
75.5%

A value of 100% means that you have an average amount of lean mass in this body segment compared to your peers. Above 100% indicates extra lean mass and less than 100% indicates less lean mass compared to your peers. Lean mass is the mass of everything except fat tissue. (17)

Trunk
LBM %
20.7%

A value of 100% means that you have an average amount of lean mass in this body segment compared to your peers. Above 100% indicates extra lean mass and less than 100% indicates less lean mass compared to your peers. Lean mass is the mass of everything except fat tissue. (17)

Right Leg
LBM %
106.3%

A value of 100% means that you have an average amount of lean mass in this body segment compared to your peers. Above 100% indicates extra lean mass and less than 100% indicates less lean mass compared to your peers. Lean mass is the mass of everything except fat tissue. (17)

Left Leg
LBM %
110.5%

A value of 100% means that you have an average amount of lean mass in this body segment compared to your peers. Above 100% indicates extra lean mass and less than 100% indicates less lean mass compared to your peers. Lean mass is the mass of everything except fat tissue. (17)

🌷 **WAS THIS REPORT HELPFUL?** 🌷

CAN WE MAKE IT BETTER?

LET US KNOW!

Scan the QR Code with your phone camera, or visit this link:

<https://forms.gle/QohE4nLQXW5eFaMS9>



Or email:

LPLS@cui.edu

Lifestyle and Parkinson's Disease Longitudinal Study (LPLS)

Health Report References

Parkinson's Disease

United Parkinson's Disease Rating Scale (UPDRS)

The MDS-UPDRS (a revision of the Movement Disorders Society - Unified Parkinson's Disease Rating Scale) is a gold-standard tool for evaluating various aspects of Parkinson's disease, including motor and non-motor experiences of daily living, and motor complications. The scale is often used in a clinical setting, as well as in research. It is administered by a researcher certified by the International Parkinson's and Movement Disorder Society.¹

The UPDRS assesses the categories of I. Mental (0-24), II. Daily Living (0-80), III. Motor (0-132), and IV. Complications (0-24). Lower scores indicate a lower impact of PD than higher scores.²

¹ Goetz, C. G., & Tilley, B. C. (2008). Movement Disorder Society-Sponsored Revision of the Unified Parkinson's Disease Rating Scale (MDS-UPDRS): Scale Presentation and Clinimetric Testing Results. *Movement Disorders*, 23(15). <https://doi.org/10.1002/mds.22340>

² Goetz, C. G., & Tilley, B. C. (2008). Movement Disorder Society-Sponsored Revision of the Unified Parkinson's Disease Rating Scale (MDS-UPDRS): Scale Presentation and Clinimetric Testing Results. *Movement Disorders*, 23(15). <https://doi.org/10.1002/mds.22340>

Normative data on UPDRS motor scores and total scores by Hoehn & Yahr Stage score³

HY Stage	No. of Patients	Motor Score: Mean (SD) [Range]	Change in Motor Score From Previous Stage	Total Score: Mean (SD) [Range]	Change from Previous Stage
0-1.5	66	11.2 (4.9) [1-23]	--	16.6 (6.6) [7-36]	--
2	347	23.7 (9.3) [1-58]	12.5	35.5 (13.3) [4-87]	18.9
2.5	72	30.2 (10.5) [10-50]	6.5	45.3 (13.6) [17-75]	9.8
3	61	35.9 (9.3) [15-56]	5.8	54.7 (12.4) [33-86]	9.9
4	67	44.1 (12.7) [26-77]	8.2	69.1 (16.5) [29-106]	14.4
5	14	54.4 (11.4) [36-72]	10.3	90.2 (25.0) [64-118]	21.1

³ Papapetropoulos, S. (2010). The clinically important difference on the unified parkinson's disease rating scale. Yearbook of Neurology and Neurosurgery, 2010, 107–108. [https://doi.org/10.1016/s0513-5117\(10\)79199-7](https://doi.org/10.1016/s0513-5117(10)79199-7)

Clinically Important Differences in UPDRS Scores: Distributions⁴

	CID, UPDRS Motor Score			CID, UPDRS Total Score		
	Minimal	Moderate	Large	Minimal	Moderate	Large
Analysis Method:						
Distribution-based analysis	2.7	6.7	10.7	4.1	10.3	16.4

These data suggest that changes in UPDRS scores of these magnitudes are meaningful in a clinical setting to understand the impact of treatment or disease progression.

⁴ Shulman LM, Gruber-Baldini AL, Anderson KE, Fishman PS, Reich SG, Weiner WJ. The Clinically Important Difference on the Unified Parkinson's Disease Rating Scale. *Arch Neurol*.2010;67(1):64–70. doi:10.1001/archneurol.2009.295

Parkinson's Disease Questionnaire (PDQ-39)

The Parkinson's Disease Questionnaire (PDQ-39) is a Parkinson's disease-specific quality of life scale that consists of 39 questions that measure eight dimensions of health: mobility, activities of daily living (ADL), emotional well-being, stigma, social support, cognitions, communication and bodily discomfort. It produces scores ranging from 0 to 100 for each subscale, where higher scores indicate a greater impact of Parkinson's disease on the subjective health status of the individual. The summary index (PDQ-SI) is also scored from 0 to 100 and is the average score of all eight subscales.⁵

⁵ JENKINSON, C., FITZPATRICK, R., PETO, V., GREENHALL, R., & HYMAN, N. (1997). The Parkinson's Disease Questionnaire (PDQ-39): development and validation of a Parkinson's disease summary index score. *Age And Ageing*, 26(5), 353–357. <https://doi.org/10.1093/ageing/26.5.353>

PD-related Quality of Life (PDQ-39) average scores by Hoehn and Yahr stage:⁶

Domain	Stage 1	Stage 2	Stage 3	Stage 4/5
Mobility	16	39	50	77
Activities of Daily Living	19	39	50	67
Emotional Well-Being	22	34	34	38
Stigma	19	33	30	45
Social	11	14	14	18
Cognitions	20	34	37	47
Communication	13	23	34	41
Body Pain	29	40	42	59
PD-Summary Index	18	32	37	49

⁶ JENKINSON, C., FITZPATRICK, R., PETO, V., GREENHALL, R., & HYMAN, N. (1997). The Parkinson's Disease Questionnaire (PDQ-39): development and validation of a Parkinson's disease summary index score. *Age And Ageing*, 26(5), 353–357. <https://doi.org/10.1093/ageing/26.5.353>

Cognition

Montreal Cognition Test (MoCa)

The MoCA is a screening tool used to assess for mild cognitive impairment in clinical and research settings. It consists of eight sections: Visuo-spatial/executive, Naming, Memory, Attention, Language, Abstraction, Delayed Recall, and Orientation. These are administered by a trained researcher. A single score is calculated and ranges from 0-30, where a higher score indicates more cognitive impairment.⁷

Interpretation of MoCA scores:⁸

	Normal	Mild Cognitive Impairment
Average MoCA score (mean)	27.4	22.1
MoCA score range	25.2–29.6	19.0–25.2
Clinical Cut-Point for Normal and Mild Cognitive Impairment*	≥ 26	< 26

*There is debate in published literature if this cut-point is an appropriate threshold for clinical assessment.

⁷ Nasreddine, Z. S., Phillips, N. A., Bédirian, V., Charbonneau, S., Whitehead, V., Collin, I., ... & Chertkow, H. (2005). *The Montreal Cognitive Assessment, MoCA: a brief screening tool for mild cognitive impairment. Journal of the American Geriatrics Society*, 53(4), 695-699.

⁸ Nasreddine, Z. S., Phillips, N. A., Bédirian, V., Charbonneau, S., Whitehead, V., Collin, I., ... & Chertkow, H. (2005). *The Montreal Cognitive Assessment, MoCA: a brief screening tool for mild cognitive impairment. Journal of the American Geriatrics Society*, 53(4), 695-699.

Physical Health

Charlson Comorbidity Index (CCI)

The Charlson Comorbidity index was developed as a method of predicting mortality by assigning different classifications, or weights, to different comorbid conditions.⁹ The total comorbidity score is a sum of subscores of varying weights from different comorbidities reported. CCI scoring ranges from 0 to 39, where a 0 indicates no comorbidities. Relatively low scores in older adults may convey mortality risk, for example some research has found that scores of 1-2, 3-4, and ≥ 5 have progressively higher mortality risk associated with them. This indicates the importance of primary prevention, treatment and reversal of chronic disease for management of overall health and mortality risk.¹⁰

⁹Charlson ME, Pompei P, Ales KL, Mackenzie CR: A New Method of Classifying Prognostic Comorbidity in Longitudinal Studies: Development and Validation. *Journal of Chronic Diseases* 40:373-383, 1987

Quan H, Li B, Couris CM, Fushimi K, Graham P, Hider P, Januel JM, Sundararajan V. Updating and Validating the Charlson Comorbidity Index and Score for Risk Adjustment in Hospital Discharge Abstracts Using Data From 6 Countries. *Am. J. Epidemiol.* (2011)doi: 10.1093/aje/kwq433

¹⁰ Charlson, M. E., Pompei, P., Ales, K. L., & Mackenzie, C. R. (1987). A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. *Journal of chronic diseases*, 40(5), 373–383.

[https://doi.org/10.1016/0021-9681\(87\)90171-8](https://doi.org/10.1016/0021-9681(87)90171-8)

¹⁰ See also: Macleod, A. D., Goddard, H., & Counsell, C. E. (2016, July). *Co-morbidity burden in parkinson's disease: Comparison with controls and its influence on prognosis*. National Library of Medicine. Retrieved November 7, 2022, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4925465/>

Blood Pressure

The risk for hypertension (high blood pressure) increases with age. Current research has shown that more than one half of Americans over 65 years of age have hypertension. With that, elevated blood pressure increases the individual's risk for cardiovascular diseases (e.g. heart attack, stroke and heart failure) and renal failure.¹¹ The table below provides current blood pressure classifications:

American College of Cardiology/American Heart Association guidelines about blood pressure.¹²

Designation	Range (Systolic / Diastolic, mmHg)
Normal	Systolic: < 120 mmHg and Diastolic: < 80 mmHg
Elevated	Systolic: 120-129 mmHg and Diastolic: < 80 mmHg
High blood pressure (Hypertension)	Systolic: 130 + mmHg or Diastolic: 80 + mmHg

¹¹ Chovanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL, et al. Seventh report of the joint national committee on prevention, detection, evaluation, and treatment of high blood pressure. *Hypertension*. 2003. 42:1206-1252.

¹² Whelton PK, Carey RM, Aronow, WS, Casey DE, Collins KJ, Himmelfarb CD, et al. [2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APha/ASH/ASPC/NMA/PCNA guideline for the prevention, detection, evaluation, and management of high blood pressure in adults: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. J Am Coll Cardiol. 2018;71\(19\):e127–e248.](#)

Central Blood Pressure (CBP)

There is emerging evidence indicating that central blood pressure may be better related to cardiovascular events than brachial blood pressure, as systolic blood pressure varies throughout our arterial trees (ex: blood pressure may be lower near the heart, compared to in the extremities).¹³ We used a non-invasive measurement of CBP in which our SphygmoCor machine used an algorithm to calculate each individual's CBP.

Large artery stiffness has also been shown to be an independent predictor of cardiovascular mortality. One of the ways we can attempt to assess this stiffness is by the non-invasive measure of Augmentation Index.¹⁴ Additional variables, such as central diastolic pressure, central pulse pressure, central augmentation index, and reflection magnitude percentage also provide some additional information about the health of the cardiovascular system that peripheral blood pressure readings are unable to assess.

¹³ Miyashita, H. (2012). Clinical Assessment of Central Blood Pressure. *Current Hypertension Reviews*, 8(2), 80–90. <https://doi.org/10.2174/157340212800840708>

¹⁴ Laurent, S., Boutouyrie, P., Asmar, R., Gautier, I., Laloux, B., Guize, L., Ducimetiere, P., & Benetos, A. (2001). Aortic stiffness is an independent predictor of all-cause and cardiovascular mortality in hypertensive patients. *Hypertension*, 37(5), 1236–1241. <https://doi.org/10.1161/01.hyp.37.5.1236>

Central Systolic Blood Pressure ¹⁵			
Age:	60-69	70-79	80-89
Normal range - Male	99-135	100-136	104-136
Normal range - Female	98-138	101-137	98-142

¹⁵ McEniery CM, Yasmin, Hall IR, Qasem A, Wilkinson IB, Cockcroft JR. Normal vascular aging: differential effects on wave reflection and aortic pulse wave velocity: the Anglo-Cardiff Collaborative Trial (ACCT). *Journal of American College of Cardiology*. 2005 46:1753-60.

Body Composition

Basic Anthropometric Data: Weight and Body Mass Index (BMI)

Body mass index (BMI) is a number derived from an individual's weight (kg) divided by height (m) squared (kg/m²). The resulting values are then used as a screening tool to identify weight issues.

The CDC guidelines on BMI:¹⁶

Body Mass Index (BMI)	Weight Status
< 18.5	Underweight
18.5–24.9	Healthy Weight
25.0–29.9	Overweight
≥ 30.0	Obese

¹⁶ *All About Adult BMI.* (2022, June 3). Centers for Disease Control and Prevention.
https://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/index.html

Bioelectrical Impedance Analysis (InBody770)

It has been well established that excess body fat, especially in the abdomen area increases risk of cardiovascular disease, hypertension, stroke, and other morbidities. Body composition, including body fat percentage, was estimated using resistance of a low electrical current being sent through the body. ¹⁷

Body Fat Percentage ¹⁸						
Female						
Age	Very lean	Excellent	Good	Fair	Poor	Very Poor
60-69	<20.2	20.2-24.5	24.6-28.2	28.3-31.4	31.5-35.5	>35.5
70-79	<18.3	18.3-23.6	23.7-27.5	27.6-30.9	31.0-35.2	>35.2
Male						
Age	Very lean	Excellent	Good	Fair	Poor	Very Poor
60-69	<18.1	18.1-20.9	21.0-23.5	23.6-26.3	26.4-29.7	>29.7
70-79	<17.5	17.5-20.9	21.0-23.6	23.7-25.7	25.8-29.3	>29.3

¹⁷ American College of Sports Medicine (2014). ACSM's Guidelines for Exercise Testing and Prescription, 9th Edition. Lippincott Williams & Wilkins.

¹⁸ American College of Sports Medicine (2014). ACSM's Guidelines for Exercise Testing and Prescription, 9th Edition. Lippincott Williams & Wilkins.

Physical Assessment

Physical Function

Short Physical Performance Battery (SPPB)

The Short Physical Performance Battery (SPPB) assesses lower body function by combining tests of balance, gait speed, and rising from a chair.¹⁹ Scores range from 0 to 12 with a low score indicating low physical function and a high score indicating high physical function. SPPB score has been linked to mortality and mobility issues in older adult populations.²⁰

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- ¹⁹ Guralnik, Jack M., Luigi Ferrucci, Carl F. Pieper, Suzanne G. Leveille, Kyriakos S. Markides, Glenn V. Ostir, Stephanie Studenski, Lisa F. Berkman, Robert B. Wallace, Lower Extremity Function and Subsequent Disability: Consistency Across Studies, Predictive Models, and Value of Gait Speed Alone Compared With the Short Physical Performance Battery, *The Journals of Gerontology: Series A*, Volume 55, Issue 4, 1 April 2000, Pages M221–M231, <https://doi.org/10.1093/gerona/55.4.M221>
- ²⁰ Guralnik, Jack M., Luigi Ferrucci, Carl F. Pieper, Suzanne G. Leveille, Kyriakos S. Markides, Glenn V. Ostir, Stephanie Studenski, Lisa F. Berkman, Robert B. Wallace, Lower Extremity Function and Subsequent Disability: Consistency Across Studies, Predictive Models, and Value of Gait Speed Alone Compared With the Short Physical Performance Battery, *The Journals of Gerontology: Series A*, Volume 55, Issue 4, 1 April 2000, Pages M221–M231, <https://doi.org/10.1093/gerona/55.4.M221>

Interpretation of SPPB score:²¹

Score	Interpretation
0-2	Disabled (if present with sarcopenia, potential cachexia, and mobility disability)
3-9	Frailty (if present with possible sarcopenia but no mobility disability)
10-12	Robustness (if present with no sarcopenia and no mobility disability)

²¹ Cesari M, Landi F, Calvani R, et al. Rationale for a preliminary operational definition of physical frailty and sarcopenia in the SPRINTT trial. *Aging Clin Exp Res*. 2017;29(1):81-88.

Guralnik JM, Simonsick EM, Ferrucci L, et al. A short physical performance battery assessing lower extremity function: association with Self-reported disability and prediction of mortality

Figure of 8 Test

The Figure of Eight (FO8) Walking Test is designed to represent everyday walking skill in daily tasks for older adults.²² The FO8 has been validated for use on Parkinson's Disease patients, and has the potential to provide more detailed data about walking difficulties that are not detected by usual gait speed measurements.²³

²² Hess, R. J., Brach, J. S., Piva, S. R., & Vanswearingen, J. M. (2010). Walking Skill Can Be Assessed in Older Adults: Validity of the Figure-of-8 Walk Test. *Physical Therapy*, 90(1), 89–99. <https://doi.org/10.2522/ptj.20080121>

²³ Kristin Lowry, Taylor Woods, Amanda Malone, Alex Krajek, Ann Smiley & Jessie Van Swearingen (2022) The Figure-of-8 Walk Test used to detect the loss of motor skill in walking among persons with Parkinson's disease, *Physiotherapy Theory and Practice*, 38:4, 552-560, DOI: [10.1080/09593985.2020.1774948](https://doi.org/10.1080/09593985.2020.1774948)

Mean FO8 scores in older adults (65+) who reported walking independently but with difficulty²⁴

Measure	Mean	95% Confidence Interval
Time to complete (seconds)	10.5	9.8–11.2
Steps taken	17.5	16.4–18.6
Subjective assessment of smoothness (0-3)	1.8	1.5–2.0
Gait speed (meters / second)	0.9	0.9–0.9

Fall risk cutoffs for FO8 in older adults²⁵

Measure	Cut-off for fall risk*	Sensitivity
Time to complete (seconds)	>9.8 seconds	76.5
Steps taken	>15.7 steps	76.5

*A score exceeding the cut-off indicates a greater likelihood of falling in the next 6 months in a population of healthy older adults.

²⁴ Rebecca J. Hess, Jennifer S. Brach, Sara R. Piva and Jessie M. VanSwearingen

PHYS THER. 2010; 90:89-99. Originally published online December 3, 2009 doi: 10.2522/ptj.20080121

²⁵ Nualyong, T., & Siriphorn, A. (2022). Accuracy of the figure of 8 walk test with and without dual-task to predict falls in older adults. *Journal of Bodywork and Movement Therapies*, 30, 69–75. <https://doi.org/10.1016/j.jbmt.2022.02.001>

Timed Up-and-Go

The Timed Up and Go test (TUG) measures lower extremity function, mobility and fall risk.²⁶ It consists of the participant rising from a chair and navigating around a cone set up at a distance of 3 meters from the chair, then returning to the seated position.

Interpretation of the Timed Up and Go²⁷

General Guidelines	
≤ 10 seconds	Normal
10 - 20 seconds*	Good mobility, can go out alone, mobile without gait aid
20 - 30 seconds*	Mobility problems, cannot go outside alone, requires gait aid

* A score of 14 seconds or higher may indicate higher fall risk

²⁶ Barry, E., Galvin, R., Keogh, C. *et al.* Is the Timed Up and Go test a useful predictor of risk of falls in community dwelling older adults: a systematic review and meta- analysis. *BMC Geriatr* 14, 14 (2014). <https://doi.org/10.1186/1471-2318-14-14>

²⁷ Podsiadlo D, Richardson S. The Time "Up & Go": A Test of Basic Functional Mobility for Frail Elderly Persons. *Journal of American Geriatrics Society* 1991; 39(2): 142-148. Shumway Cook A, Brauer S, Woollacott M. Predicting the Probability for Falls in Community Dwelling Older Adults Using the Timed Up & Go Test. *Physical Therapy* 2000; 80(9): 896-903. Lusardi MM, Pellecchia GL, Schulman M. Functional Performance in Community Living Older Adults. *Journal of Geriatric Physical Therapy* 2003; 26(3): 14-22. Saskatoon Falls Prevention Consortium, Falls Screening and Referral Algorithm, TUG, Saskatoon Falls Prevention Consortium, June 2005

Normative Data by Age Category	
Age (Years)	Mean TUG Completion Time (Seconds)
60-69	7.9 ± 0.9
70-79	7.7 ± 2.3
80-89	No device: 11.0 ± 2.2 With device: 19.9 ± 6.4
90-101	No device: 14.7 ± 7.9 With device: 19.9 ± 2.5

* “Device” means any kind of walking aid that could be used, such as a cane or walker.

Dual Task Protocol

To assess cognition, the TUG test is modified by adding a cognitive task. Reduced gait speed can be predictive of early cognitive decline, making the TUG Dual Task procedure a useful tool for screening individuals early for beginning cognitive impairment.²⁸ Participants were instructed to count backwards by threes from a randomly selected number while performing the TUG protocol (as in the mini-BESTest, a comprehensive older adult assessment of physical function).²⁹

If the difference in speed between TUG and TUG Dual Task is 10% slower, dual tasks may significantly impact walking.³⁰ An individual whose time on the TUG Dual Task is >15 seconds is classified as being a “faller.”³¹

²⁸ Cedervall, Y., Stenberg, A. M., Åhman, H. B., Giedraitis, V., Timmark, F., Berglund, L., Halvorsen, K., Ingelsson, M., Rosendahl, E., & Åberg, A. C. (2020). Timed Up-and-Go Dual-Task Testing Cohen, S., & Janicki-Deverts, D. (2012). Who's stressed? Distributions of psychological stress in the United States in probability samples from 1983, 2006, and 2009. *Journal of Applied Social Psychology*, 42(6), 1320–1334. <https://doi.org/10.1111/j.1559-1816.2012.00900.x> in the Assessment of Cognitive Function: A Mixed Methods Observational Study for Development of the UDDGait Protocol. *International Journal of Environmental Research and Public Health*, 17(5), 1715. <https://doi.org/10.3390/ijerph17051715>

²⁹ Franchignoni F, Horak F, Godi M, Nardone A, Giordano A. Using psychometric techniques to improve the Balance Evaluation Systems Test: the mini-BESTest. *J Rehabil Med*. 2010 Apr;42(4):323-31. doi: 10.2340/16501977-0537. PMID: 20461334; PMCID: PMC3228839.

³⁰ King, L., & Horak, F. (2013). On the Mini-BESTest: Scoring and the Reporting of Total Scores. *Physical Therapy*, 93(4), 571–5. doi:10.2522/ptj.2013.93.4.571 (pub med link) note: subscription to Physical Therapy Journal required for login

³¹ Anne Shumway-Cook, Sandy Brauer, Marjorie Woollacott, Predicting the Probability for Falls in Community-Dwelling Older Adults Using the Timed Up & Go Test, *Physical Therapy*, Volume 80, Issue 9, 1 September 2000, Pages 896–903, <https://doi.org/10.1093/ptj/80.9.896>

Physical Fitness

400 Meter Walk Test

The 400-M Walk Test involves the participant walking 10 laps around two cones spaced 20 meters apart. It has been shown to be predictive of mortality, mobility limitation, and disability.³² The time to complete the test varies by age, sex and cardiorespiratory fitness level. Some normative data from older adults suggests that most adults complete the test between 4.5 to 7.5 minutes.³³ The average speed of the 400-M Walk Test has been shown to be associated with various health outcomes (see Table on the following page).

³² Newman AB, Simonsick EM, Naydeck BL, Boudreau RM, Kritchevsky SB, Nevitt MC, Pahor M, Satterfield S, Brach JS, Studenski SA, Harris TB. Association of long-distance corridor walk performance with mortality, cardiovascular disease, mobility limitation, and disability. *JAMA*. 2006;295:2018–2026.

³³ Vestergaard S, Patel KV, Bandinelli S, Ferrucci L, Guralnik JM. Characteristics of 400-meter walk test performance and subsequent mortality in older adults. *Rejuvenation Res*. 2009 Jun;12(3):177-84. doi: 10.1089/rej.2009.0853. PMID: 19594326; PMCID: PMC2939839.

Association of average gait speed from the 400m Walk Test and health outcomes ³⁴		
< 0.5 m/s	0.5 – 1.0 m/s	> 1.0 m/s
Frail	Some ADL disability	Lower risk of hospitalization and adverse events
Risk of death	Risk of falls	Independent in ADLs
Highly dependent	Cognitive decline in 5 years	Can cross street safely
Limited walking ability or only comfortable walking in the home	Able to walk easily in public places	More Fit
Functional impairment	Some independent self-care	Can shop for groceries and perform light yard work
Risk of hospitalization		

³⁴ Bouchard, Danielle R. (Ed.) (2020). Exercise and Physical Activity for Older Adults. Champaign, IL: Human Kinetics Publishers

Muscular Strength:

Handgrip Strength

Handgrip strength can be used as an index of overall strength.³⁵ It is often used for its simplicity and predictive power for overall health and mortality.³⁶

Average grip strength (kg) by decade for males and females ³⁷		
Age (Years)	Males	Females
50-59	44.8	27.6
60-69	41.1	24.9
70-79	35.6	22.0
80-89	29.4	17.9

³⁵ Newman AB, Kupelian V, Visser M, Simonsick EM, Goodpaster BH, Kritchevsky SB, Tyllavsky FA, Rubin SM, Harris TB. Strength, but not muscle mass, is associated with mortality in the health, aging and body composition study cohort. J Gerontol A Biol Sci Med Sci. 2006 Jan;61(1):72-7. doi: 10.1093/gerona/61.1.72. PMID: 16456196.

³⁶ Newman AB, Kupelian V, Visser M, Simonsick EM, Goodpaster BH, Kritchevsky SB, Tyllavsky FA, Rubin SM, Harris TB. Strength, but not muscle mass, is associated with mortality in the health, aging and body composition study cohort. J Gerontol A Biol Sci Med Sci. 2006 Jan;61(1):72-7. doi: 10.1093/gerona/61.1.72. PMID: 16456196.

³⁷ Roush JR, Gombold KL, Bay RC. Normative Grip Strength Values in Males and Females, ages 50 to 89 years old. The Internet Journal of Allied Health Sciences and Practice. 2017 Dec 22;16(1), Article 7.

Psychological Health

Center for Epidemiological Studies Depression Scale (CES-D)

The CES-D, developed in 1977, is a short survey used to assess symptoms of depression in individuals from the general population. It is intended for use in epidemiological studies.³⁸

It consists of 20 questions with possible total scores ranging from 0 - 60. Higher scores indicate greater depressive symptoms and higher risk for clinical depression.³⁹ Individuals who score > 16 are considered to be at greater risk of depression than those who score below, although clinical diagnosis of depression cannot be assessed through simple survey responses, rather through working with a clinical psychologist.⁴⁰

³⁸ Radloff, L. S. (1977). "The CES-D scale". *Applied Psychological Measurement*, 1(3), 385–401. <https://doi.org/10.1177/014662167700100306>

³⁹ Radloff, L. S. (1977). "The CES-D scale". *Applied Psychological Measurement*, 1(3), 385–401. <https://doi.org/10.1177/014662167700100306>

⁴⁰ Lewinsohn, P.M., Seeley, J.R., Roberts, R.E., & Allen, N.B. (1997). Center for Epidemiological Studies-Depression Scale (CES-D) as a screening instrument for depression among community-residing older adults. *Psychology and Aging*, 12, 277- 287.

Profile of Social Support (ISEL)

The Profile of Social Support questionnaire measures perceived availability of four separate functions of social support as well as providing an overall social support score. The scale consists of 40 questions with a total score ranging from 0 to 120. The four subscales are appraisal support, self-esteem support, belonging support, and tangible support and consist of 10 questions each. Each subscale will have a score ranging from 0 to 30.⁴¹ Low scores indicate low social support and high scores indicate high social support.

⁴¹ Cohen, S., & Hoberman, H. (1983). Positive events and social supports as buffers of life change stress. *Journal of Applied Social Psychology*, 13, 99-125.

Profile of Mood States (POMS)

The Profile of Mood States (POMS) is a widely used assessment of transient mood states, and has been incorporated into many studies to assess mood and changes in mood in a variety of medical settings.⁴² The scale consists of 40 questions which provides seven subscales and a total mood disturbance (global) score. The subscales are negative moods (tension [0-24], depression [0-24], anger [0-20], fatigue [0-28] and confusion [0-20]) and the positive moods (esteem-related affect [0-24] and vigor [0-20]). Total Mood Disturbance (TMD) is calculated by subtracting the positive scores from the negative scores. The possible resulting values are -44 to 116. Higher TMD scores indicate greater mood disturbance or psychological distress.⁴³

⁴² Nyenhuis, D.L., Yamamoto, C., Luchetta, T., Terrien, A. and Parmentier, A. (1999), Adult and geriatric normative data and validation of the profile of mood states. *J. Clin. Psychol.*, 55: 79-86.
[https://doi.org/10.1002/\(SICI\)1097-4679\(199901\)55:1<79::AID-JCLP8>3.0.CO;2-7](https://doi.org/10.1002/(SICI)1097-4679(199901)55:1<79::AID-JCLP8>3.0.CO;2-7)

⁴³ Tobar, D. A., Stegner, A. J., & Kane, M. T. (1999). The use of generalizability theory in examining the dependability of scores on the profile of mood states. *Measurement in Physical Education and Exercise Science*, 3(3), 141–156.

Perceived Stress (PSS)

The Perceived Stress Scale (PSS) is designed to assess an individual's perceptions of their stress in the past month, and is used clinically and in research to predict stress-related health outcomes.⁴⁴ The scale consists of 10 questions with scores ranging from 0 to 40. Low scores indicate few experiences of stress and high scores indicate many experiences of stress.

Norms by age from 2,000 community-based respondents in the US⁴⁵

Age (years)	Mean Score	Standard Deviation
< 25	16.8	6.9
25-34	17.5	7.3
35-44	16.4	7.1
45-54	16.9	7.8
55-64	14.5	7.2
> 64	11.1	6.7

⁴⁴ Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, 24(4), 385–396.

⁴⁵ Cohen, S., & Janicki-Deverts, D. E. N. I. S. E. (2012). Who's stressed? Distributions of psychological stress in the United States in probability samples from 1983, 2006, and 2009 1. *Journal of applied social psychology*, 42(6), 1320-1334.