

Measuring functional



To design an effective exercise program, you must know your clients' physical state. But choosing the right assessment tools can prove a challenge

by C. Jessie Jones and Roberta E. Rikli

fitness of older adults

Helping to delay physical frailty and improve functional mobility among older adults are two of the most important goals of senior fitness instructors. Many would say the quality of life in later years depends to a large degree on *being able to continue to do what you want, without pain, for as long as possible*. Designing effective exercise programs that can help older adults maintain or improve their mobility requires two prerequisites:

1. An understanding of the physical attributes needed for mobility tasks in later years; and
2. The ability to assess physical attributes, so that client weaknesses can be detected and then targeted for individualized programming.

Many senior fitness instructors have been especially frustrated with the lack of tests available to assess the functional fitness of older adults, particularly tests that have accompanying performance standards.

Recognizing the need for a tool to evaluate the functional fitness performance of older adults, researchers at California State University, Fullerton, recently developed and validated a new fitness test battery especially for older adults: the Senior Fitness Test (Rikli and Jones, 2001).

The test is based on a functional fitness framework (see Figure 1), which points out that being able to perform everyday activities (e.g. personal care, shopping, housework) requires the ability to perform functional movements, such as walking, stair climbing and standing up; and that these functional movements, in turn, are dependent on having sufficient physiologic reserve (i.e. strength, endurance, flexibility, balance). One unique feature of the Senior Fitness Test is that it measures physiologic parameters using functional movement tasks, such as standing, bending, lifting, reaching and walking.

Figure 1. A functional ability framework indicating the physiologic parameters associated with functions required for basic and advanced everyday activities. R.E. Rikli & C.J. Jones, 2001, Senior Fitness Test Manual (Champaign, IL: Human Kinetics). Adapted with permission.

PHYSICAL PARAMETERS	FUNCTIONS	ACTIVITY GOALS
Muscle strength/endurance	Walking	Personal care
Aerobic endurance	Stair climbing	Shopping/errands
Flexibility	Standing up from chair	Housework
Motor ability power speed/agility balance	Lifting/reaching	Gardening
	Bending/kneeling	Sports
Body composition	Jogging/Running	Traveling
Physical impairment	Functional limitation	Reduced ability/Disability

Importance of functional fitness in older adults
Functional fitness performance is *having the physiologic capacity to perform normal everyday activities safely and independently without undue fatigue* (Rikli and Jones, 1999a). Reasons why it is important to assess the functional fitness of older adults include the following:

Identification of at-risk participants.

Many independent older adults, often due to their sedentary lifestyles, function dangerously close to their maximum ability level during normal activities. Climbing stairs or getting out of a chair requires near maximum effort for many older individuals (Evans, 1995). Unfortunately, more than one-third of community-dwelling older adults are at risk for mobility problems and falls (Rose, 2002). Early identification of physical decline and appropriate interventions could help to prevent functional impairments, such as in walking and stair climbing, that often

result in falls and physical frailty (Alliance for Aging Research, 1999).

One goal of fitness practitioners should be to help with the early identification of at-risk participants, and either to provide a targeted intervention program or to make appropriate medical referrals for a complete diagnosis, treatment and maintenance plan.

Program planning and evaluation. To plan safe and effective exercise or physical activity programs for older adults, it is important to know as much as possible about the client's health and fitness status, current physical activity level, activities likes and dislikes, and personal goals.

A comprehensive functional fitness test provides specific information regarding a client's physical strength and weaknesses associated with functional tasks and activity goals important to everyday

Continued on page 26

living. This information is necessary to design individualized, targeted exercise or physical activity programs for clients. Also, baseline measures repeated at multiple intervals during the program provide critical data to track the progress of clients, to make program adjustments, to provide personalized feedback and to evaluate program effectiveness.

Assessment skills are especially important for fitness instructors in this era of accountability. Many facility directors now require fitness instructors to evaluate progress and document program and client outcomes (Russek, Wooden, Ekedahl, & Bush, 1997).

Goal setting and motivation of participants. Most people recognize that remaining physically active is essential for optimal health and physical ability, yet less than 25% of older adults get enough exercise to derive such benefits (National Blueprint, 2001). According to experts in the field of behavior change, setting goals powerfully motivates people to improve their fitness levels (Blair, Dunn, Marcus, Carpenter, & Jaret, 2001; Dishman, 1998). Assessing the functional fitness levels of participants is a precursor to helping them set worthwhile short- and long-term personal goals.

To facilitate goal setting, it is especially helpful to relate the purpose and results of assessments to the types of daily tasks and activities clients hope to continue to do or want to do better. For example, upper body strength is important for performing household and other activities that involve lifting and carrying things, such as groceries, suitcases and grandchildren. A short-term goal may be to improve upper body strength by 20%, while a long-term goal may be to be able to do yard work or pick up a grandchild.

The periodic assessment and monitoring of performance motivates older adults. It also encourages their progress and exercise compliance. Many older adults

have related how motivated they are by taking the Senior Fitness Test and finding out how they compare to others of the same age and gender. The testing itself causes many people to pay more attention to their fitness and physical activity level.

Selecting assessment tools

An instructor should consider several factors before selecting assessment tools to measure the functional fitness of older adults:

1.

What is the purpose of the assessment tool?

These tools measure a variety of physiologic parameters and functional activities. Instructors should select assessment tools based on what they hope to see change in their clients.

Ideally, it is recommended that instructors measure more than just the physical parameters of the body, such as upper body strength, power, flexibility, aerobic endurance, dynamic balance and body composition. Assessment tools that also measure functional performance, such as walking distance or time and stair climbing ability, are meaningful to older adults.

2.

What is the functional mobility level of the participants?

Some assessment tools are specifically designed for use with either the frail or the healthy older adult. Few are able to assess the wide range of ability levels that most senior fitness instructors encounter. It would be ideal for instructors to select test items they can use with a wide range of functional abilities—from the borderline frail to the highly fit. This type of test is especially useful for tracking a person over time.

3.

Is the assessment tool reliable and valid for use with the older adult population? This is one of the most important factors to consider when selecting an assessment tool. Validity refers to whether a test item

measures what it is intended to measure; reliability refers to the dependability of test scores. A reliable test produces similar scores from one trial to another, or one day to the next, when an individual (or group of individuals) administers it.

Scoring accuracy is an important test characteristic, especially if more than one person is going to administer the same test item (Rikli and Jones, 1997).

Literature may report a test to have good *intrarater* reliability (same evaluator) or *interrater* reliability (different evaluators), but it is still necessary for anyone who administers a test to be appropriately trained on the test protocol and recording procedures and, if possible, evaluated for test reliability.

Instructors should never assume that tests developed and validated for younger age groups will be appropriate for older adults. They should check that the test items being considered have supporting data documenting its reliability and validity based on studies involving older adults.

4.

Is the assessment tool feasible to use?

Feasibility refers to the suitability of administering the test items in a given setting. Instructors should consider the following additional questions to determine feasibility:

- What type of equipment is needed?
- What is the cost of the equipment?
- How long does each test item take to administer?
- How much space is needed?
- How difficult are the test items to administer and score?
- Can paraprofessionals administer the tests?
- Are the test items safe to give?
- Is a physician's release necessary for the participant to take the tests?
- Does a physician need to be present?



5. *Does the assessment tool have performance standards?* The first thing people want to know after taking a test is how they did. Performance standards improve the usefulness and interpretability of test scores. Ideally, test items include both normative and criterion-referenced standards. Normative standards make it possible for older adults to compare their scores with others of the same age and gender. Criterion-referenced standards provide an important *threshold* point for evaluating performance relative to some performance goal, such as maintaining the ability to perform everyday activities. It also provides information to help identify individuals at risk for loss of mobility.

One new assessment tool available to instructors is the Senior Fitness Test (SFT), which evaluates the functional fitness performance of older adults (Rikli and Jones, 2001).

New test to assess functional fitness

The SFT measures the underlying physical parameters associated with functional ability, and identifies whether an older adult may be at risk for loss of functional ability. The SFT meets

scientific standards for validity and reliability (Rikli and Jones, 1999a). It is also quick and easy to administer and score, requires minimal equipment, and is safe to use with a wide range of physical abilities.

(An important note for instructors teaching group classes: the reliability of each test item was determined using trained older adult volunteers as testing technicians.)

Each test item has accompanying performance standards for men and women ages 60 to 94-plus based on a national study of more than 7,000 Americans (Rikli and Jones, 1999b). Additionally, the SFT provides threshold values on each test item (criterion-reference points) that help to identify if an older adult is at risk for mobility loss (Rikli and Jones, 2001).

The accompanying sidebar provides a brief overview of the test items in the Senior Fitness Test, as well as the score indicating whether a person is at risk for loss of functional mobility. Tables 1 and 2 give normal range scores for men and women, with *normal* defined as the middle 50% of the population. Participants scoring above the normal

range would be considered *above average* for their age, while those scoring below the range would be *below average*.

The *Senior Fitness Test Manual* (Rikli and Jones, 2001), published by Human Kinetics, includes a complete description of the test items. The manual describes the theoretical basis and developmental procedures for the test, and contains complete information on how to administer and score the test, interpret results, provide feedback to test participants about their results and organize and test groups of older adults. The appendix has reproducible sample forms, charts, tables and posters for instructors to use in their programs. Percentile norm tables for men and women ages 60 to 94, subdivided into five-year age groups, are also included.

The key to effective assessments

Assessing the functional fitness performance of older adults is an essential element in designing effective exercise programs for older adults. But not all assessment tools are the same. We highly recommend that all senior fitness instructors meet the recommended national standards published by Jones and Clark (1998) to have the knowledge necessary to select, administer and interpret fitness assessments. ▼

C. Jessie Jones, Ph.D., and Roberta E. Rikli, Ph.D., are professors in the Division of Kinesiology and Health Promotion at California State University, Fullerton. For more information, contact

The Senior Fitness Test items: a brief overview

References

Alliance for Aging Research. (1999). *Independence for older Americans: An investment for our nation's future*. Washington, DC: Alliance for Aging Research

Blair, S.N., Dunn, A.L., Marcus, B.H., Carpenter, R.A., and Jaret, P. (2001). *Active Living Every Day*. Champaign, IL: Human Kinetics

Dishman, R. (1998). *Exercise Adherence*. Champaign, IL: Human Kinetics

Evans, W.J. (1995, October). *Keys to successful aging*. Paper presented at the International Conference on Aging and Physical Activity, Colorado Springs, CO

Jones, C.J. & Clark, J. (1998). "National standards for preparing senior fitness instructors." *Journal of Aging and Physical Activity*, 6, 207-221

Rikli, R. & Jones, C.J. (2001). *Senior Fitness Test Manual*. Champaign, IL: Human Kinetics

Rikli, R. & Jones, J. (1999a). "Development and validation of a functional fitness test for community-residing older adults." *Journal of Aging and Physical Activity*, 7, 129-161

Rikli, R. & Jones J. (1999b). "Functional fitness normative scores for community-residing older adults, ages 60-94." *Journal of Aging and Physical Activity*, 7, 162-181

Rikli, R. & Jones, J. (1997). "Assessing physical performance in independent older adults: Issues and guidelines." *Journal of Aging and Physical Activity*, 5, 244-261

Russeck, L., Wooden, M., Ekedahl, S., and Bush, A. (1997). "Attitudes toward standardized data collection." *Physical Therapy*, 77, 714-729

Rose, D.J. (in press). "Promoting functional independence in older adults at risk for falls: The need for a multidimensional programming approach." *Journal of Aging and Physical Activity*

Table 1: Normal range of scores for men, with *normal* defined as the middle 50% of the population. Those scoring above this range would be considered *above average* for their age and those below the range as *below average*.

Normal Range of Scores - Men

	60-64	65-69	70-74	75-79	80-84	85-89	90-94
Chair stand (no. of stands)	14 - 19	12 - 18	12 - 17	11 - 17	10 - 15	8 - 14	7 - 12
Arm Curl (no. of reps)	16 - 22	15 - 21	14 - 21	13 - 19	13 - 19	11 - 17	10 - 14
6-Min Walk (no. of yds)	610 - 735	560 - 700	545 - 680	470 - 640	445 - 605	380 - 570	305 - 500
2-Min Step (no. of steps)	87 - 115	86 - 116	80 - 110	73 - 109	71 - 103	59 - 91	52 - 86
Chair Sit-&-Reach (inches +/-)	-2.5 - +4.0	-3.0 - +3.0	-3.5 - +2.5	-4.0 - +2.0	-5.5 - +1.5	-5.5 - +0.5	-6.5 - -0.5
Back Scratch (inches +/-)	-6.5 - +0.0	-7.5 - -1.0	-8.0 - -1.0	-9.0 - -2.0	-9.5 - -2.0	-10.0 - -3.0	-10.5 - -4.0
8-Ft Up-&-Go (seconds)	5.6 - 3.8	5.7 - 4.3	6.0 - 4.2	7.2 - 4.6	7.6 - 5.2	8.9 - 5.3	10.0 - 6.2

Table 2: Normal range of scores for women, with *normal* defined as the middle 50% of the population. Those scoring above this range would be considered *above average* for their age and those below the range as *below average*.

Normal Range of Scores - Women

	60-64	65-69	70-74	75-79	80-84	85-89	90-94
Chair stand (no. of stands)	12 - 17	11 - 16	10 - 15	10 - 15	9 - 14	8 - 13	4 - 11
Arm Curl (no. of reps)	13 - 19	12 - 18	12 - 17	11 - 17	10 - 16	10 - 15	8 - 13
6-Min Walk (no. of yds)	545 - 660	500 - 635	480 - 615	430 - 585	385 - 540	340 - 510	275 - 440
2-Min Step (no. of steps)	75 - 107	73 - 107	68 - 101	68 - 100	60 - 91	55 - 85	44 - 72
Chair Sit-&-Reach (inches +/-)	-0.5 - +5.0	-0.5 - +4.5	-1.0 - +4.0	-1.5 - +3.5	-2.0 - +3.0	-2.5 - +2.5	-4.5 - +1.0
Back Scratch (inches +/-)	-3.0 - +1.5	-3.5 - +1.5	-4.0 - +1.0	-5.0 - +0.5	-5.5 - +0.0	-7.0 - -1.0	-8.0 - -1.0
8-Ft Up-&-Go (seconds)	6.0 - 4.4	6.4 - 4.8	7.1 - 4.9	7.4 - 5.2	8.7 - 5.7	9.6 - 6.2	11.5 - 7.3

30-Second Chair Stand



Purpose

To assess lower body strength, needed for numerous tasks such as climbing stairs, walking and getting out of a chair, tub or car. Also reduces the chance of falling.

Description

Number of full stands that can be completed in 30 seconds with arms folded across chest.

Risk zone

Less than 8 unassisted stands for men and women.

Arm Curl



Purpose

To assess upper body strength, needed for performing household and other activities involving lifting and carrying things such as groceries, suitcases and grandchildren.

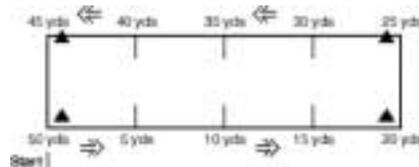
Description

Number of bicep curls that can be completed in 30 seconds holding a hand weight of 5 lbs (2.27 kg) for women; 8 lbs (3.63 kg) for men.

Risk zone

Less than 11 curls using correct form for men and women.

6-Minute Walk



Purpose

To assess aerobic endurance, which is important for walking distances, stair climbing, shopping, sightseeing while on vacation, etc.

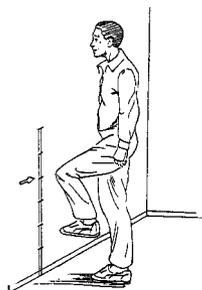
Description

Number of yards/meters that can be walked in 6 minutes around a 50-yard (45.7 meter) course. (5 yds = 4.57 meters)

Risk zone

Less than 350 yards for men and women.

2-Minute Step Test



Purpose

Alternate aerobic endurance test, for use when space limitations or weather prohibits taking the 6-minute walk test.

Description

Number of full steps completed in 2 minutes, raising each knee to a point midway between the patella (kneecap) and iliac crest (top hip bone). Score is number of times right knee reaches the required height.

Risk zone

Less than 65 steps for men and women.

Chair Sit-and-Reach



Purpose

To assess lower body flexibility, which is important for good posture, for normal gait patterns and for various mobility tasks, such as getting in and out of a bathtub or car.

Description

From a sitting position at front of chair, with leg extended and hands reaching toward toes, the number of inches (cm) (+ or -) between extended fingers and tip of toe.

Risk zone

Men: Minus (-) 4 inches or more
Women: Minus (-) 2 inches or more

SFT Brief Summary

©1999 R.E. Rikli and C.J. Jones

Continued on page 30

Back Scratch



Purpose

To assess upper body (shoulder) flexibility, which is important in tasks such as combing one's hair, putting on overhead garments and reaching for a seat belt

Description

With one hand reaching over the shoulder and one up the middle of the

back, the number of inches (cm) between extended middle fingers (+ or -).

Risk zone

Men: Minus (-) 4 inches or more

Women: Minus (-) 2 inches or more

8-Foot Up-and-Go



Purpose

To assess agility/dynamic balance, which is important in tasks that require quick

maneuvering, such as getting off a bus in time or getting up to attend to something in the kitchen, to go to the bathroom or to answer the phone.

Description

Number of seconds required to get up from a seated position, walk 8 feet (2.44 m), turn, and return to seated position.

Risk zone

More than 9 seconds.

SFT Brief Summary

©1999 R.E. Rikli and C.J. Jones

The *Senior Fitness Test Manual* and accompanying training video and software can be purchased through Human Kinetics: 1-800-747-4457 (U.S.), 1-800-465-7301 (Canada), or www.humankinetics.com

1/2 Page B/W Ad