

HEALTH AND FUNCTIONAL FITNESS ASSESSMENT

Objectives

1. Identify the importance of appropriate health and fitness assessment for mature clients
2. List the three criteria for selecting assessments
3. Identify common functional assessments that are useful with mature clients
4. Describe how to properly perform the following assessments:
 - a. 30 second Chair Stand
 - b. 8' Up and Go
 - c. Resting blood pressure
 - d. Modified Clinical Test of Sensory Interaction in Balance (mCTSIB)
 - e. Posture and Body Alignment

Introduction

The assessment of health and functional fitness should be an integral first step in the training process for mature clients whenever possible. It will provide critical information necessary for developing a prioritized and effective exercise program. Additionally, follow-up assessments should be performed periodically to gauge progress and, if necessary, redirect the exercise routine. While there are numerous assessments from which to choose, not all are appropriate and most do not assess functional performance.

Assessments should be well-documented in the research literature as being valid and reliable with mature populations and provide information as to a client's functional abilities. Prudent selection is also important because some tests have floor or ceiling effects which limit their

ability to be used with certain individuals. This module will explain the criteria for selecting appropriate assessments, describe useful assessments with mature clients and teach you how to perform several of them.

Considerations for Exercise Testing

Due to the increased risk for and prevalence of chronic diseases and orthopedic limitations in the mature population, trainers should fully evaluate their clients before beginning an exercise training program with them. The evaluation should include a comprehensive health history questionnaire, goal setting, and fitness testing. While it is common for trainers to use the Physical Activity Readiness Questionnaire (PAR-Q) to screen clients, this is not always appropriate for older clients since the tool is only validated for use with clients up to the age of 69. In addition, the PAR-Q does not provide any specific information on the types and/or

severity of existing diseases and conditions. It is more appropriate to instead evaluate clients using a health history questionnaire that includes an assessment of current chronic diseases, current risk factors for disease, current medications, prior surgeries and their dates, current musculoskeletal/orthopedic conditions, current illnesses and injuries, and history of physical activity and exercise. If qualified, the fitness professional could also conduct some basic health-related tests such as height/weight, body composition, resting heart rate, and resting blood pressure. This information will provide a well-rounded view of the client's physical needs. Following the health history evaluation should be a discussion of the client's goals. Given the diversity of the mature population it is a mistake to make assumptions about the client's goals. It is critical to understand what outcomes are important to them – improved health, quality of life, fitness, function, pain reduction, sports performance, disease management, stress reduction, social interaction, or more.

Exercise testing is an extremely useful tool that should be a standard part of the client intake process in addition to a comprehensive health history questionnaire. Testing can help the trainer develop appropriate training programs, monitor outcomes more effectively, and make referrals for further medical evaluation when necessary. A wide variety of fitness assessment tools are available for professionals to use but not all have been validated for use with older populations.

Trainers should choose assessments for their older clients based on three basic criteria: 1) existing health conditions and physical limitations of the client 2) purposes for conducting the assessment and 3) expertise or skill of the professional conducting the test. Although numerous assessments have been developed and validated for use with older populations (see table) the trainer must choose judiciously. Many assessments have either floor or ceiling effects that limit their use to clients within certain ranges of functional capacity.

Elite and physically fit older adults can typically participate in many of the standard fitness tests validated with younger populations that measure maximal aerobic capacity or muscle strength. Maximal tests of aerobic capacity can be conducted using motorized treadmills, cycle ergometers or in the field (e.g. Cooper 12-minute test; 1.5 mile test for time). The gold standard for measuring muscle strength is the one-repetition maximum (1RM) test. This can be conducted using free weights, variable resistance machines, or specialized equipment such as isokinetic dynamometers following established protocols and guidelines.

Physically independent, frail, and dependent older adults should participate in targeted assessments appropriate for their level of function and health. For the independent adult this could also include submaximal measures of fitness commonly used with younger populations such as the YMCA submaximal

bicycle ergometer test, a standard sit and reach test, or abdominal curl-up test. Multiple repetition maximum tests of muscular strength are commonly used as a safer alternative to 1RM testing. However, predicting maximal strength with older populations is not as accurate and may therefore yield unreliable results.

Functional fitness testing in the older adult can include assessments of static balance, dynamic balance, agility, mobility, gait, flexibility, whole-body function, and other components. Assessments can be single-task, dual-task, combinations of functional activities or composite measures. A commonly used assessment tool is the Senior Fitness Test Battery.

The Senior Fitness Test Battery (Rikli and Jones 2001) consists of 7 tests that measure muscular strength, flexibility, cardiorespiratory endurance, dynamic balance/agility, and body composition (Table 26.1). Each test has been proven to be valid and reliable for use with older populations, is relatively safe, requires minimal equipment, requires minimal training for the tester, and can easily be performed with groups. Normative tables allow comparison of results with others of similar age and gender.

A number of questionnaires and scales have been developed to evaluate functional capacity such as the Katz Index of Activities of Daily Living, Barthel Index, Instrumental Activities of Daily Living (IADL) Screening

Questionnaire, and the Medical Outcomes Study Short Form 36 (SF36). However, the usage of these tools is typically limited to the clinical, nursing home or retirement setting for use with frail and dependent populations.

Common Tests of Physical Function for Older Adults

TEST	MEASURES	DESCRIPTION
Senior Fitness Test Battery		
8' Up and Go	Agility; Dynamic Balance	How quickly a person can walk around a cone 8 feet away from, and returning to, a sitting position
30 Second Chair Stand	Lower-Body Strength	How many times a person can stand up from a seated position in 30 seconds.
2-minute Step Test	Cardiorespiratory Endurance	How many times a person can step in place in 2 minutes.
6-minute Walk	Cardiorespiratory Endurance	How far a person can walk in 6 minutes.
Back Scratch	Upper-Body Flexibility	How close a person can get their fingers when reaching one hand over their shoulder and the other

		hand behind their back.
Sit and Reach	Lower-Body Flexibility	How close to, or past, their toe a person can reach with both hands while in a seated position with an outstretched leg.
30-second Arm Curl	Upper-Body Strength	How many times a person can curl a dumbbell (5 pounds for women; 8 pounds for men) in 30 seconds in a seated position.
Other Tests		
Continuous Scale Physical Functional Performance 10 Test (CS-PFP)	Upper and lower body strength, upper body flexibility, balance and coordination, and endurance.	A battery of 10 everyday tasks such as pouring, sweeping a floor, and climbing stairs.
Performance-Oriented Mobility Assessment (POMA)	Static and Dynamic Balance and Gait	Composite score of a variety of functional

		tasks involving balance and gait.
Dynamic Gait Index	Gait and Dynamic Balance	Composite score of several gait-related tasks such as walking with head turns; stepping over obstacles; and stair-climbing.
Walkie-Talkie Test	Divided Attentional Demands	How well a person can talk and walk simultaneously.
Balance-Specific Tests		
Modified Clinical Test of Sensory Interaction in Balance	Visual, Vestibular and Somatosensory System Contributions to Balance	How long (up to 30 seconds) and individual can stand under four conditions: Eyes Open Stable Surface; Eyes Closed Stable Surface; Eyes Open Unstable Surface;

		Eyes Closed Unstable Surface
One-Leg Stand	Static Balance	How long a person can stand on one leg (up to 30 seconds).
Berg Balance Scale	Static and Dynamic Balance	Composite score of 14 different tasks such as transferring from a chair; turning 360 degrees while standing; stepping up onto a bench.
Fullerton Advanced Balance Scale	Static and Dynamic Balance	Composite score of 10 functional tasks such as tandem walk, stand on one leg, and two-foot jump.
Tinetti Balance and Gait	Static and Dynamic Balance and Gait	Composite score of 9 functional tasks such as rising from a chair and standing with eyes closed.

Functional Reach Test	Limits of Stability	How far a person can reach forward in a standing position
Multi-Directional Reach Test	Limits of Stability	How far a person can lean to the front, sides and rear in a standing position.

Functional Assessments

The 30 second chair stand and the 8' up and go are both part of the Senior Fitness Test (SFT). The full battery also includes the following tests: seated arm curl, 2 min step (or 6 min walk), chair sit-and-reach, back scratch, and height and weight. The SFT is a widely used assessment battery designed and validated specifically for use with older adults. It uses normative tables from data collected on over 7,000 men and women, ages 60-94.

In order to score the 30 second chair stand and the 8' up and go you will need to purchase the Senior Fitness Test Manual -2nd edition by Rikli and Jones (Human Kinetics), 2013.

30 second Chair Stand

The purpose of this test is to assess lower-body strength in a functional manner.

The test can be performed with minimal equipment. All that is needed is a stopwatch and a straight-back or folding chair with a seat height of 17 in. The chair should be placed against the wall to prevent slipping during the test.

Instruct the client to sit in the middle of the chair with back straight, feet flat on the floor, and arms crossed at the wrists and held against the chest. Using the command "Ready, Set, Go" the client should rise to a full stand and then return to a fully seated position. You should encourage them to complete as many full stands as possible in 30 seconds. Demonstrate the test slowly to them to show proper form, then at a faster pace to show that the purpose of the test is to do as many as they can in the 30 seconds. Before testing, have the client practice one or two chair stands with proper form.

The client's score is the number of stands that they are able to complete in 30 seconds. If a person is more than halfway up at the end of 30 seconds, it counts as a full stand. If the client cannot perform even one chair stand without using their hands their score is zero. However, allow the client to perform the test by using their arms to push off their legs or the chair, or use a cane or walker if necessary. This will provide a baseline for assessing improvement or decline over time. Only one

trial should be administered.

Tips:

- Elbows should stay tight to the body the whole time. The client should avoid swinging their arms away from their body.
- Brace the chair against the wall or have someone hold it steady during the test.
- Stay close to the client and be ready to steady them if needed.
- The client's body weight should shift fully to the chair seat when they sit down.

8' Up and Go

The purpose of this test is to assess agility and dynamic balance.

The only equipment needed is a stopwatch, a straight-back or folding chair with a seat height of 17 inches, a tape measure, and a cone. Place the chair against the wall facing a cone placed exactly 8 feet away (measured from the front edge of the chair to the farthest edge of the cone).

Instruct the client to sit in the middle of the chair with back straight, feet flat on the floor and hands on the thighs. One foot should be placed slightly in front of the other foot with the torso slightly leaning forward (in the "ready" position). On the command "ready, set, go" the client gets up from the chair, walks as quickly as possible around either side of the cone, and sits back down in the chair. The timer should start on the word "go" whether or not the client has started to move and the

timer should stop at the instant the person sits back down on the chair.

Demonstrate the proper form and have the client practice it once at slow speed. Instruct the participant to walk "as quickly and safely as possible." Administer two test trials. Record both times to the nearest tenth of a second, and use the fastest time for their score. If needed, a cane or walker can be used for this test, but scores should not be compared to the norms and the type of adaptation used should be recorded.

Tips:

- It is important to spot the client during the test. Stand between the chair and cone in order to assist them if they lose their balance but without impeding their path.
- For frailer clients move with them so that you will be within helping distance as they round the cone and as they sit back down.

Berg Balance Scale

The Berg Balance Scale (BBS) is a 14-item scale designed to measure balance of the older adult in a clinical or community setting with minimal equipment. It typically takes around 15-20 minutes to complete. It is more appropriate for lower-functioning adults since there is a potential ceiling effect with higher level clients. The BBS is one of the most widely used and researched balance tools.

For detailed instructions and a description of each test item refer to the supplementary document.

Modified Clinical Test of Sensory Interaction in Balance (mCTSIB)

The modified Clinical Test of Sensory Interaction on Balance (mCTSIB) is a simplified derivative of the CTSIB, or “Foam and Dome” test which assesses the patient’s functional balance control during four sensory conditions. Although the mCTSIB data set can document the presence of sensory dysfunction, it cannot provide impairment information specific to an individual sensory system. The information provided is designed to help the clinician assess the need for further testing in patients with complaints related to balance dysfunction and to establish objective baselines for treatment planning and outcome measurement.

1. Eyes open firm surface
2. Eyes closed firm surface
3. Eyes open unstable surface (foam)
4. Eyes closed unstable surface (foam)

Purpose of Test:

This test is designed to assess how well an older adult is using sensory inputs when one or more sensory systems are compromised. In condition one, all sensory systems (i.e., vision, somatosensory, and vestibular) are available for maintaining balance. In condition two, vision has been removed and the older adult must rely on the somatosensory and vestibular systems to balance. In condition three, the somatosensory system has been compromised and the older adults must use vision and the vestibular system to balance. In condition four, vision has been removed

and the somatosensory system has been compromised so they must rely primarily on the vestibular inputs to balance.

Begin timing each trial using a stopwatch. The trial is over when (a) the participant opens his/her eyes in an eyes closed condition (b) raises arms from sides (c) loses balance and requires manual assistance to prevent a fall.

This test provides some insight into whether each of the sensory systems available for balance is being used effectively. Failure to maintain balance in condition two indicates that the older adult is visually dependent. They are not using somatosensory inputs to maintain balance when eyes are closed. Failure to maintain balance in conditions 3 and 4 indicate that the visual and/or vestibular system is not being used to maintain balance. Poor performance on this test would suggest the need for multisensory training if the medical history does not indicate that an actual problem(s) exists (e.g. peripheral neuropathy).

**Administer only one trial per condition if participant able to complete first trial without loss of balance.*

Condition One: Eyes Open, Firm Surface

Trial One Total Time: _____ / 30 sec

Trial Two Total Time: _____ / 30 sec

Trial Three Total Time: _____ / 30 sec

Condition Three: Eyes Open, Foam Surface

Trial One Total Time: _____ / 30 sec

Trial Two Total Time: _____ / 30 sec

Trial Three Total Time: _____ / 30 sec

Condition Two: Eyes Closed, Firm Surface

Trial One Total Time: _____ / 30 sec

Trial Two Total Time: _____ / 30 sec

Trial Three Total Time: _____ / 30 sec

Condition Four: Eyes Closed, Foam Surface

Trial One Total Time: _____ / 30 sec

Trial Two Total Time: _____ / 30 sec

Trial Three Total Time: _____ / 30 sec

TOTAL: _____ / 120 sec

Condition	Possible Impairments	Recommended Exercises
1 – Eyes Open, Firm Surface (3/3 systems available)	1. Poor gaze stabilization 2. Poor use of surface cues 3. Lower body weakness	Teach visual “spotting” Balance activities with reduced/occupied/absent vision
2 – Eyes Closed, Firm Surface	1. Poor use of surface cues 2. Lower body weakness 3. Fear of falling	Increased awareness of surface information through verbal cueing during standing exercises. Balance activities with reduced/occupied/absent vision Lower body activities against resistance Confidence-building activities
3 – Eyes Open, Foam Surface (2/3 systems available) Somatosensory information reduced	1. Poor use of vision 2. Lower body weakness 3. Poor center-of-gravity control	Gaze stabilization techniques. Balance activities performed on compliant, or moving surfaces. Lower body exercises against resistance.
		Standing center-of-gravity activities on compliant surfaces of different thickness.
4 – Eyes Closed, Foam Surface (1/3 systems available) Somatosensory reduced and vision absent.	1. Poor use of vestibular inputs 2. Fear of falling in high sway condition 3. Lower body weakness	Balance activities performed on compliant/moving surfaces with vision reduced/occupied/absent. Voluntary sway activities to build confidence. Lower body exercise against resistance.

Posture and Body Alignment

A systematic approach to postural analysis involves viewing the body's anatomical alignment relative to a certain established reference line. This reference (gravity) line serves to divide the body into equal front and back halves and to bisect it laterally. In preparing to carry out postural assessment, the examiner should be aware of factors that will enhance the success and validity of the examination process.

These factors are:

1. Postural assessment must be performed with the subject minimally clothed, in order to ensure a clear view of the contours and anatomical landmarks used for reference. Tank tops, sleeveless shirts or sports bras with shorts and bare feet are recommended.
2. Subjects should stand in front of a posture grid for evaluation of the lateral, anterior and posterior views. Pictures are a great way to show the clients the postural deviations that need to be addressed.
3. The examiner should instruct the subject to assume a comfortable and relaxed posture. Many clients will try to assume a "military" stance that does not represent their typical posture.
4. Subjects who use orthotic or assistive devices should be assessed with and without them to determine their effectiveness in correcting posture.
5. The examiner should note relevant medical history and other information that may account for certain postural abnormalities.

Important information includes:

- Any history that accounts for present postural abnormalities
- A complete description of present symptoms
- The upper limb dominance of the subject, which is often responsible for symptomatic postural deviations

Common posture faults include:

Head and Neck

- * Forward head
- * Flattened lordotic cervical curve
- * Excessive lordotic cervical curve

Shoulders

- * Internally rotated shoulders
- * Shoulder height asymmetry
- * Rotation of the upper body

Thoracic Spine

- * Kyphosis
- * Scapular protraction
- * Scapular elevation
- * Barrel chest
- * Funnel chest
- * Pigeon chest

Pelvis and Lumbar Spine

- * Lordosis
- * Sway back
- * Flat back
- * Anterior pelvic tilt
- * Posterior pelvic tilt

Hips

- * Hip height asymmetry
- * Hip rotation
- * Hip internal or external rotation

Knees

- * Flexed
- * Extended
- * Valgum
- * Varum
- * Medial
- * Lateral

Ankles and Feet

- * Supinated
- * Pronated
- * Inverted
- * Everted

Unfortunately these individuals have accumulated compensations, dysfunctions, and poor movement patterns. Many times this becomes a neurological pattern which makes it imperative for the students to understand proper movement patterns without sacrificing correct alignment throughout the entire kinetic chain. When exercising, these students need to be aware of good posture and maintain this through the duration of the exercise. If this becomes harder and harder to sustain, the exercise must be modified.

This modification can be done in many ways:

- * Decrease the load
- * Change the ROM
- * Decrease the lever length
- * Change the speed
- * Increase the stability
- * Add assistance
- * Change the vector angle
- * Decrease the complexity