



TRAINERMETRICS

ASSESSMENT PROTOCOLS

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BASIC DATA

Weight

Purpose: Weight is a standard metric required to compute many assessments and is widely used in health related settings.

Equipment: Scale (lbs)

Protocol: Step on a scale and record body weight in pounds. For the most accurate reading remove excess weight and stand as still as possible.

Body Mass Index:

Purpose: BMI is a useful measure of overweight and obesity by a value calculated from weight and height.

Equipment: None

Procedure: Input weight in pounds, and height feet and inches.

INTERNAL HEALTH

Blood Pressure:

Purpose: The pressure that exerts on the walls of arteries. Diastolic pressure measures the pressure in the bloodstream when the heart (left ventricle) is relaxed and filling with blood. Systolic blood pressure measures the forces exerted after the heart contracts.

Equipment: Blood pressure cuff and stethoscope

Procedure:

1. Have the participant sit down with arm supported and level to the heart.
2. Strap the cuff about 1 inch above the elbow making sure the fit is snug.
3. Place the diaphragm of the stethoscope over the brachial artery and put ear pieces in ears.
4. Tighten the screw on the hand pump of the cuff and inflate until the last heard heart beat, record this number as the Systolic measurement.



5. Slowly loosen the screw to let out air in the cuff at about 5mm/dl/sec. Continue to listen the heart beat until you can't hear anymore, record this number as the diastolic measurement.

BODY COMPOSITION

Skinfold Measurements:

Purpose: Estimate body fat % based on measurements of subcutaneous fat.

Equipment: Skin fold caliper

Procedure: Measurements are taken on the right side of body. Caliber needs to be perpendicular to the site analyzed. The participant must relax the muscle group that is being assessed. When skin fold is pinched, the practitioner should be taking reading at the middle of the pinched skin, not apex or base. Wait 1 to 2 seconds after releasing caliper, record closest 0.5mm. Retake each site in order to obtain accurate readings.

Skinfold sites:

- Tricep: vertical fold at the midpoint of the posterior side of tricep between shoulder and elbow with arm relaxed at the side.
- Bicep: vertical fold at the midpoint of the anterior side of bicep between shoulder and elbow with arm relaxed at the side.
- Chest: diagonal fold half the distance between anterior axillary line and the nipple.
- Subscapular: diagonal fold 2cm from inferior angle of the scapula.
- Midaxillary: at midaxillary line horizontal to xiphoid process of the sternum.
- Abdominal: vertical fold 2cm to the right of the navel
- Suprailiac: diagonal fold parallel and superior to the iliac crest.
- Thigh: midpoint of the anterior side of the upper leg between the patella and top of thigh.

Bioelectrical Impedance (B.I.A.)

Purpose: Non-invasive way to compute body fat by running electrical current through the body.

Equipment: BIA device.

Procedure:



- No consumption of food or beverage within 4 hours of test
- No exercise within 12 hours of test
- Expel any excess liquid 30 minutes prior testing (urine)
- Alcohol consumption not permitted within 48 hours of testing
- No diuretics within a week before the test unless noted by practitioner
- No caffeine prior to testing

Body Girth Analysis (Circumferences)

Purpose: Estimate of body fat % commonly used by the United States Armed Forces.

Equipment: Tape measure.

Procedure: (circumferences)

Male:

- Waist: one inch above the navel or smallest circumference below the rib cage after complete expiration.
- Neck: circumference around the neck at a point below the larynx and perpendicular to the long axis of the neck.

Female:

- Waist: one inch above the navel or smallest circumference below the rib cage after complete expiration.
- Neck: circumference around the neck at a point below the larynx and perpendicular to the long axis of the neck.
- Hip: largest circumference around the gluteals with subjects heels together.

Lean Body Mass & Ideal Weight:

Purpose: Lean Body Mass is your weight without fat. Ideal Weight is your weight with a target body fat %.

Equipment: Body fat caliper, tape measure, or BIA device

Procedure: Body fat % is used in determining lean body mass and ideal weight. The data is a result of the most recent metrics used in Body Fat % assessments. In order to know how much excess body fat you have based on goals, input target body fat %.

Resting Metabolic Rate

Purpose: Those who have weight loss or weight gaining goals should be cautious of their caloric intake and output. RMR is an estimate of caloric expenditure while the body is at rest.

Equipment: None

Procedure: Recommended Caloric Intake numbers are the suggested caloric requirements for someone who has an active lifestyle. Active can be defined as a person or persons whom walk between 7,000-10,000 steps per day.

Circumferences

Purpose: A measure of all body circumferences as well as inputs for Body Girth and Waist to Hip Ratio.

Equipment: Measuring tape

Procedure: (use measuring tape to measure the following)

- Neck: circumference around the neck at a point below the larynx and perpendicular to the long axis of the neck.
- Chest: measurement taken with arms straight at sides, tape should pass under arms around back and after complete expiration.
- Waist: one inch above the navel or smallest circumference below the rib cage after complete expiration.
- Hip: largest circumference around the gluteals with subjects heels together.
- Bicep: largest circumference around midpoint between the elbow and shoulder with arm extended in front of body and palm supinated
- Forearm: largest circumference around forearm with arm extended in front of body and palm supinated
- Thigh: largest circumference around the upper thigh below the gluteal fold.

- Calf: largest circumference around calf, generally the midpoint between ankle and knee.

Waist to Hip Ratio:

Purpose: A measure of the ratio of your waist circumference to hip circumference to determine body fat distribution and can be an indicator of metabolic disease.

Equipment: Measuring tape

Procedure: (use measuring tape to measure the following)

- Waist: one inch above the navel or smallest circumference below the rib cage after complete expiration.
- Hip: largest circumference around the gluteals with subjects heels together.

CARDIOVASCULAR

Resting Heart Rate

Purpose: There is a positive correlation between low heart rates of trained individuals and a reduction in cardiac exertion.

Equipment: Index and middle fingers or heart rate monitor

Procedure: For measuring heart rate without the use of a heart rate monitor, palpation of the pulse at the radial artery is most common. Use index and middle finger and press against the radial artery on the lateral portion of the wrist. For resting heart rate, palpate for 15 seconds while counting HR, multiply beats by 4.

Target Heart Rate Zones

Purpose: Estimate Target Heart Rate Zones based on the age predicted maximum heart rate in order to prescribe an appropriate training intensity.

Equipment: Index and middle fingers or heart rate monitor

Procedure: For measuring heart rate without the use of a heart rate monitor, palpation of the pulse at the radial artery is most common. Use index and middle finger and press against the radial artery on the lateral portion of the wrist. For resting heart rate, palpate for 15 seconds while counting HR, multiply beats by 4.

Estimate VO₂max – Sub Maximal Testing

Walk Test (Low skill level)

Purpose: Estimate the body's ability to deliver oxygen to determine cardiovascular fitness level.

Equipment: Standard track or treadmill.

Procedure: Begin with a moderate warm up. Start stopwatch at the beginning of the walk; stop the stopwatch at the end of one mile. This test is appropriate for those who cannot run due to various conditions. The participant should walk the full mile without jogging (no flight phase), keeping their exercise heart rate high. Record heart rate 10 seconds after finishing mile.

Step Test Intermediate skill level)

Purpose: Estimate the body's ability to deliver oxygen to determine cardiovascular fitness level.

Equipment: Risers with a platform set up at 16 inches high.

Procedure: The participant will step up and down (right foot up, left foot up, right foot down, left foot down) metronome set at 22 step/minute for women and 24 steps/minute for a duration of 3 minutes. The wizard is used if the practitioner does not have a heart rate monitor. If using a heart rate monitor input final heart rate in beats/minute at the end of 3 minutes.

1.5 Mile Run Test (High Skill Level)

Purpose: Estimate the body's ability to deliver oxygen to determine cardiovascular fitness level.

Equipment: Standard track or treadmill

Procedure: Begin with a moderate warm up. Start stopwatch at the beginning of run; stop the stopwatch at the end of the distance. Participant should be able to jog for at least 15 minutes to complete this test. The total distance is 1.5 miles; on a standard track is 6 laps. Pacing and constant motivation are important in order to complete the test in the fastest time possible with an accurate estimation of V_O2max.

Bruce Treadmill Test (Most Accurate)

Purpose: Estimate the body's ability to deliver and extract oxygen to determine cardiovascular fitness level.

Equipment: Treadmill

Procedure: Bruce test is considered a maximal exercise test where the athlete or client runs to complete fatigue as the treadmill speed and incline are increased every three minutes. Record total running time.

Stages:

- Stage 1 = 1.7 mph at 10% Grade
- Stage 2 = 2.5 mph at 12% Grade
- Stage 3 = 3.4 mph at 14% Grade
- Stage 4 = 4.2 mph at 16% Grade
- Stage 5 = 5.0 mph at 18% Grade
- Stage 6 = 5.5 mph at 20% Grade
- Stage 7 = 6.0 mph at 22% Grade
- Stage 8 = 6.5 mph at 24% Grade
- Stage 9 = 7.0 mph at 26% Grade

BIOMECHANICS

Overhead Squat Assessment

Purpose: Detect observable muscular deviations related to overactive and underactive skeletal muscle.

Equipment: None

Procedure:

- Participant begins assessment screen with feet shoulder width apart and arms fully extended bisecting ears, (shoes off and eyes closed is optional).
- He or she then begins to flex knees and hips so their body moves into a squat like motion with arms remaining overhead.

- It is most effective for the practitioner instruct the participant to allow 4 seconds for both phases of the squat.
- Continue having the participant squat until the anterior, lateral, and posterior views have been assessed.
- Mark checkpoints that are deviated along the kinetic chain.

Sit and Reach

Purpose: Assess and compare posterior chain flexibility to healthy norms.

Equipment: Yardstick and tape.

Procedure: Before testing allow participant to adequately stretch as well as perform moderate aerobic exercise. Consult with participant about any past muscular problems in their back.

- The participant must sit without shoes and heels need to bisect the yardstick. The heels should not pass the 15 inch segment that is taped off.
- Hands are placed on top of each other straight out in front of subject.
- He or she slowly reaches forward touching the yardstick holding for two seconds.
- The better of two trials performed is recorded.

Trunk Lift

Purpose: Assess and compare posterior chain strength and anterior flexibility to healthy norms.

Equipment: Yardstick or 12 inch rule, tape.

Procedure: Before testing allow participant to adequately stretch as well as perform moderate aerobic exercise. Consult with participant about any past muscular problems in their back.

- The client lays face down position, with lower body relaxed and hands placed under or to the side of thighs.
- To maintain spinal alignment, instruct client to maintain focus on the floor with chin tucked.
- The client lifts their upper body off the floor, to a maximum height of 12 inches.
- The measurement is the distance from the floor to the student's chin.
- Two trials are allowed, with the best score recorded.

STRENGTH

Estimated One Repetition Maximum (1RM)

Back Squat

Purpose: To measure estimated maximal strength based off of sub maximal effort.

Equipment: Standard 45lbs barbell with adjustable weight.

Procedure: Use appropriate warm up methods to activate agonist, antagonist, and synergist muscle groups prior to testing sub-maximal and maximal lifts. It should take minimally 5 testing sets to reach an appropriate relative intensities at under 35 total repetitions. At any point of failure, be sure to to confidently re-rack the barbell for the participant.

Begin with a barbell resting on the upper trapezius, behind the participant's neck. Cue him or her to take in a deep breath at the top, begin to lower the body in squat by flexing at the knee and hip joints, pushing the gluteals out, and keeping weight on the heels, in one fluid motion. The bottom of the squat is reached when the upper legs are parallel to the ground, and the lower leg and spine are parallel. On the up phase, concentrically contract the gluteals to raise the body while breathing out.

Deadlift

Purpose: To measure estimated maximal strength based off of sub maximal effort.

Equipment: Standard 45lbs barbell with adjustable weight.

Procedure: Use appropriate warm up methods to activate agonist, antagonist, and synergist muscle groups prior to testing sub-maximal and maximal lifts. It should take minimally 5 testing sets to reach an appropriate relative intensities at under 35 total repetitions. At any point of failure, be sure to to confidently re-rack the barbell for the participant.

Begin with the barbell on a flat surface, and the participant's feet underneath the bar. He or she must lower their body down maintaining a forward head, straight back, thighs parallel to the ground, and knees flexed under 90 degrees. Next, cue the participant grasp the barbell with an overhand grip and chest up. The participant should pull the bar off the ground by concentrically contracting the gluteal and driving hips forward. Instruct the participant to stand up, raising the shoulders and hips at the same time, but keeping the knees slightly bent. The bar should roll up and make contact with the thighs. Slowly, lower the bar back down to the ground, by flexing at the hip and knee joint (or dropping barbell at the top of the movement).

Bench Press

Purpose: To measure estimated maximal strength based off of sub maximal effort.

Equipment: Standard 45lbs barbell with adjustable weight.

Procedure: Use appropriate warm up methods to activate agonist, antagonist, and synergist muscle groups prior to testing sub-maximal and maximal lifts. It should take minimally 5 testing sets to reach an appropriate relative intensities at under 35 total repetitions. At any point of failure, be sure to to confidently re-rack the barbell for the participant.

Subject must lay with upper and lower back flat on the bench. The participant should have hands gripping the barbell at shoulder width apart. Without a spotter he or she needs to un-rack the barbell, slowly lower the load to the sternum, and concentrically contracting the pectoral muscles to press load. Every repetition should consist of complete elbow extension for the press and the barbell touching the chest while in the down position.

Bent Over Row

Purpose: To measure estimated maximal strength based off of sub maximal effort.

Equipment: Standard 45lbs barbell with adjustable weight.

Procedure: Use appropriate warm up methods to activate agonist, antagonist, and synergist muscle groups prior to testing sub-maximal and maximal lifts. It should take minimally 5 testing sets to reach an appropriate relative intensities at under 35 total repetitions. At any point of failure, be sure to to confidently re-rack the barbell for the participant.

Begin with the participant's feet shoulder width apart, and barbell in hands with a wide overhand grip. The participant begins by pushing gluteals out and bending over while maintaining a flat and with abdominals flexed. Spine should be approximately parallel to the ground. With arms hanging perpendicular to the floor, pull barbell up to the sternum keeping elbows as wide as possible. At the end of the lift, drop barbell, and slowly come back to a standing position by contracting gluteals.

Overhead Press

Purpose: To measure estimated maximal strength based off of sub maximal effort.

Equipment: Standard 45lbs barbell with adjustable weight.

Procedure: Use appropriate warm up methods to activate agonist, antagonist, and synergist muscle groups prior to testing sub-maximal and maximal lifts. It should take minimally 5 testing sets to reach an appropriate relative intensities at under 35 total repetitions. At any point of failure, be sure to to confidently re-rack the barbell for the participant.

Start by instructing the participant to place the barbell on anterior shoulders with elbows in front (front-rack position) and slowly take the barbell off of the rack. Make sure the participant is a few steps away from the rack with feet shoulder width apart and head forward. Cue him or her to take a big breath, hold it, and drive the bar over head. At the top of the position, be sure that the barbell is directly over the head and elbows are locked out with traps contracted. To lower the bar, slightly lean back and lower the bar until at forehead level and then catch bar back in front-rack position. At the end of the lift re-rack the barbell.

**If subject can not perform the exercise with proper technique, address muscular imbalances. Reference corrective exercise and muscular imbalance matrix in "Program"*

ENDURANCE

YMCA Bench Press

Purpose: Evaluate the ability of the upper anterior chain muscle groups to sustain repeated contractions against resistance for an extended period of time or until failure.

Equipment: Bench, metronome (60 ticks/min), and 80lbs barbell (Male) or 35lbs barbell (Female)

Procedure: The participant must lay with their upper back and gluteals flat on the bench. Coach should give the barbell to the participant and be able to aid at failure. The participant should have hands at shoulder width apart starting in the down position with barbell on chest and elbows flexed. Every repetition should consist of complete elbow extension for the press. The descent of the barbell should remain controlled, touching the sternum for every repetition. The test is performed at 30 repetitions per minute until participant can't keep cadence and or reaches muscular failure.

Maximum Repetition

Pull Ups

Purpose: Evaluate the ability of the upper posterior chain muscle groups to sustain repeated contractions against body weight resistance for an extended period of time or until failure.

Equipment: Horizontal bar (stationary)

Procedure: A horizontal bar should be mounted out of the participants reach if their upper arms extended over head. They begin by hanging from bar with arms fully extended and hands positioned slightly wider than shoulders and pronated. Instruct the participant to vertically pull their body straight upward until their chin is above the bar. To return to down

position, the participant should lower their body down until arms are fully extended. The test is stopped if the he or she can not get their chin above the bar.

Push Ups

Purpose: Evaluate the ability of the upper anterior chain muscle groups to sustain repeated contractions against body weight resistance for an extended period of time or until failure.

Equipment: 5 inch tall block (or clenched fist)

Procedure:

Male:

Begin in push up position with only hands and toes touching the floor, and block directly under the participant's sternum. Their hands should be directly under shoulders. Keeping the body isometrically contracted, begin movement lowering the body towards the floor with upper-arms roughly 45 degrees from the participant's body. Once the participant touches the block with sternum, instruct him or her to drive body upwards by contracting pectoral and triceps muscle groups.

Female:

Begin in push up position with only hands and knees touching the floor, and block directly under the participant's sternum. Their hands should be directly under shoulders. Keeping the body isometrically contracted, begin movement lowering the body towards the floor with upper-arms roughly 45 degrees from the participant's body. Once the participant touches the block with sternum, instruct him to drive body upwards by contracting pectoral and triceps muscle groups.

Sit Ups

Purpose: Evaluate the ability of the core and mid body muscle groups to sustain repeated contractions against body weight resistance for an extended period of time or until failure.

Equipment: Exercise mat

Procedure: Participant lies in a supine position on their mat with knees bent at approximately 45 degrees with feet flat on the floor and slightly apart. His or her hands should rest at their side flat on the floor. Instruct the participant to tuck their chin to their chest and begin contracting anterior abdominal muscles until their upper back is off the mat and hands have moved forward approximately 5 inches. Keeping heels in contact with the mat, once the participant reaches the top of the movement he or she can slowly return their upper back to the floor and continue repetitions.

Squats

Purpose: Evaluate the ability of the lower body and core muscle groups to sustain repeated contractions against body weight resistance for an extended period of time or until failure.

Equipment: Chair or box (approximately same height as participant's knees)

Procedure: Instruct the participant to stand in front of the box with feet slightly outside of their shoulders and forward. Cue him or her to take in a deep breath at the top, begin to lower the body in by flexing at the knee and hip joints, pushing the gluteals out, and keeping weight on the heels, in one fluid motion. The bottom of the squat is reached when the upper legs are parallel to the ground, the lower leg and spine are parallel. On the up phase, instruct him or her to concentrically contract the gluteals, driving hips forward to raise the body while breathing out. Repetitions should be completed until their body fatigues and can not perform correct technique.

Inverted Row

Purpose: Evaluate the ability of the upper posterior chain muscle groups to sustain repeated contractions against body weight resistance for an extended period of time or until failure.

Equipment: Horizontal bar (stationary)

Procedure: A horizontal Bar is mounted 30 inches above the ground (i.e. utilizing a squat rack). The participant must lie under the bar positioning their body so their sternum is directly beneath the bar. Their knees should be flexed at 90 degrees with feet flat on the floor. The participant must grip the bar directly outside of their shoulders. The participant starts in the down position by locking out hips and elevating their upper and mid body off the ground by flexing their core. The subject will then keep their heels on the ground and begin pulling their body up until their sternum touches the bar. Return to down position until arms are fully extended before attempting another repetition.

Maximum Time

Plank

Purpose: Evaluate the ability of the mid body and core muscle groups to sustain isometric contractions against body weight resistance for an extended period of time or until failure.

Equipment: Exercise mat and stopwatch

Procedure: The participant lies face down on a mat resting on forearms and a portion of their palms flat on the floor in line with their elbows. He or she will flex their quadriceps, gluteals, and core to raise the body up off the floor keeping their back parallel to the floor by flexing their entire core. At the end of the duration, instruct the participant to stop exercise by returning both knees to the floor.