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🌐 Twenty-Six Body Measurements for the Somatomap App

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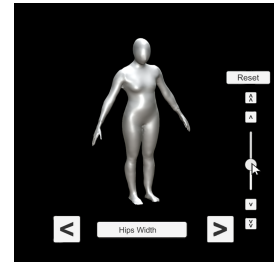
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We use this protocol and it's working

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Disclaimer

We are not responsible for the accuracy or reliability of measurements collected by users. Anyone using this protocol should undergo proper training and establish inter-rater reliability prior to data collection.

Abstract

The present protocol describes the standardized measurements for the 26 body parts corresponding to the *Somatomap 3D* application. *Somatomap 3D* is a digital avatar tool which enables one to alter the size/shape of 26 different body parts. The physical measurements recorded by this protocol can be used in comparison to body size alterations on the application to calculate body size estimation accuracy. This protocol is specific to *Somatomap 3D* to promote accuracy and consistency in data.

Image Attribution

Screenshot of Somatomap 3D avatar, modified by the author. Used with permission.



Guidelines

After reviewing the protocol measurement details, take the participant's measurements using a tape measure and stadiometer.

- Ensure the participant is standing upright, looking straight ahead.
- Have a copy of the protocol measurements sheet on hand and follow it closely.
- Record all measurements on either a paper form or an electronic data capture form.
- Pull the tape measure snugly and evenly across the body (horizontally), and record measurements to the nearest 1 cm.
- Measure at the "0" point or at the end of the tape, depending on where "0" starts on your tape measure.
- Take measurements on both the right and left sides and record the mean value.

Materials

1. Sewing tape measure
2. Stadiometer
3. Scale (for measuring body weight)
4. Body composition device (e.g., DXA scanner or BIA device)

Before start

Warning: Do not let participants see the protocol or their measurements.

Basic measuring pointers

- Ask the participant to remove any heavy or bulky clothing, shoes, and socks.
- Ask the participant to stand straight, facing forward, with arms hanging naturally at their sides and feet parallel on the ground.
- Ask the participant to take a deep breath, exhale fully, and then take measurements in this relaxed state.



Standard Protocol Measurement

26m

1 Neck Girth

1m

Ask the participant to stand upright, looking straight ahead. Measure the neck circumference at the midpoint (1/2-way point) of the measured neck length.

2 Neck Height

1m

Ask the participant to stand with their head tilted upward, looking above them. Measure the distance from the suprasternal notch (the dip at the base of the throat between the collarbones) to the angle of the mandible (the corner of the lower jaw). Take measurements on both the right and left sides.

3 Shoulder Width

1m

Ask participant to stand straight, with their chin perpendicular to the ground and arms relaxed at their side. Measure from the most lateral point of one acromion process, across the front of the upper chest, to the most lateral point of the opposite acromion process. The acromion process is the bony prominence at the highest point of the shoulder.

4 Bust Girth:

1m

Measure the circumference of the participant's upper body (around the back and chest), aligning the tape measure at the level of the nipples. The participant's arms should hang naturally at their sides in a relaxed position.

5 Chest Girth

1m

Measure the circumference of the participant's upper body (around the back and chest), aligning the tape measure at the level of the axilla (armpits). The participant's arms should hang naturally at their sides in a relaxed position.

6 Abdomen Protrusion (Stomach Form)

1m

Measure the length along the curvature of the abdomen at the midline, from the xiphoid process (the small bony tip at the bottom of the sternum) to the upper edge of the pubic symphysis (the joint at the front of the pelvis where the two pubic bones meet). The participant's arms should hang naturally at their sides in a relaxed position.

7 Upper Arm (Bicep) Girth

1m

Measure the circumference at the midpoint (1/2-way point) between the acromion process (the bony prominence at the highest point of the shoulder) and the olecranon process (the bony prominence of the elbow). The participant's arms should hang naturally at their sides in a relaxed position. Take measurements on both the right and left sides and record the mean.

8 Upper Arm Length

1m



Measure vertically from the acromion process (the bony prominence at the highest point of the shoulder) to the olecranon process (the bony prominence of the elbow). The participant's arms should hang naturally at their sides in a relaxed position. Take measurements on both the right and left sides and record the mean.

9 Elbow Girth

1m

Locate the olecranon process (the bony prominence of the elbow) and measure the circumference around the elbow at that level. If the olecranon is difficult to locate, ask the participant to bend their elbow slightly, as this will make the protrusion more prominent. Take measurements on both the right and left sides and record the mean.

10 Lower Arm (Forearm) Girth

1m

Measure the circumference at the midpoint (1/2-way point) between the olecranon process (the bony prominence of the elbow) and the crease of the wrist at the base of the hand on the palmar side. The participant's arms should hang naturally at their sides in a relaxed position. Take measurements on both the right and left sides and record the mean.

11 Lower Arm (Forearm) Length

1m

Measure vertically from the olecranon process (the bony prominence of the elbow) to the crease of the wrist at the base of the hand on the palmar side. The participant's arms should hang naturally at their sides in a relaxed position. Take measurements on both the right and left sides and record the mean.

12 Wrist Girth

1m

Measure the circumference of the wrist, over the ulnar styloid (bony prominence of the wrist, on the pinky side). Arms should be hanging naturally at the sides in a relaxed position. Take measurements on both the right and left sides and record the mean.

13 Hand Size

1m

Measure the circumference of the hand above the base of the thumb across the palm. Take measurements on both the right and left hands and record the mean.

14 Hand Length

1m

Measure the vertical length of the hand from the top of the middle finger to the first wrist crease on the palmar side. Take measurements on both the right and left sides and record the mean.

15 Torso Length

1m

Ask the participant to tilt their head forward and to place their hands on their iliac crests (typically at the level of the navel). Measure vertically from the bony prominence at the base of their neck down the spine to the midpoint between participant's hands, as they rest them on their iliac crests.

16 Waist Size

1m

Measure the circumference at the midpoint (1/2-way point) between the lowest rib and the highest point of the iliac crest (typically at the level of the navel), at the end of the participant's normal expiration. The participant's arms should hang naturally at their sides in a relaxed position.

17 **Hip (Buttocks) Size**

1m

Measure the circumference at the widest part of the hips and buttocks. This area typically falls 18-20 cm below the natural waist, which is located midway between the lower ribs and the iliac crest. Use the greater trochanter of the femur (the bony prominence at the upper outer thigh) as a bony landmark to help locate the widest point of the hip.

Before measuring, ask the participant to stand with their legs close together. Anchor one end of the tape measure at the widest point of one hip and hold it firmly in place while wrapping the other end of the tape measure around the hips. Ensure the tape measure remains horizontal and parallel to the floor throughout the measurement.

18 **Hip Width:**

1m

Use the same landmarks as for hip (buttocks) size (widest point of the hips, near the level of the greater trochanter). Instead of measuring around the body, measure the straight lateral distance from the outermost point of one hip to the outermost point of the other, in the front.

19 **Thigh Girth**

1m

Measure the circumference at the midpoint (1/2-way point) of the thigh height. Take measurements on the right and left thigh girth to obtain the mean.

20 **Thigh Length**

1m

Measure vertically from the iliac crest to the top of the patella (kneecap). Take measurements on the right and left thigh height to obtain the mean.

21 **Knee Girth**

1m

Locate the middle of the patella and measure horizontally all the way around the knee. Take measurements on both the right and left sides and record the mean.

22 **Lower Leg Length**

1m

Measure vertically from the top of the patella (commonly known as the kneecap) down to the lateral malleolus (bony prominence on the outer side of your ankle). Take measurements on both the right and left sides and record the mean.

23 **Lower Leg (Calf) Girth**

1m

Measure the circumference of the calf at the upper 1/3 of the distance from the top of the patella to the medial malleolus. Take measurements on both the right and left sides and record the mean.

24 **Ankle Girth**

1m

As participant stands with legs apart, measure at narrowest point of the ankle. Move the tape measure up and down the area until the narrowest point is located. Take

measurements on both the right and left sides and record the mean.

25 Feet Width

1m

Measure horizontally across the widest part of the foot (typically across the ball of the foot). Take measurements on both the right and left sides and record the mean.

26 Feet Length

1m

Measure vertically from the longest toe (typically the big toe or second toe) to the back of the heel. Take measurements on both the right and left sides and record the mean.

Additional Body Measurements

2m

27 Height (in cm)

1m

Ask the participant to remove hair ornaments, jewelry, buns, or braids from the top of the head that may interfere with the measurement. Shoes and socks should also be removed. Ask the participant to stand straight against the backboard, with body weight evenly distributed and both feet flat on the stadiometer platform. The participant's feet should be positioned with the heels together and toes pointed slightly outward, approximately at a 160-degree angle. Check to ensure that the back of the head, shoulder blades, buttocks, and heels make contact with the stadiometer backboard.

NOTE: Depending on the individual's overall body conformation, all four contact points—head, shoulders, buttocks, and heels—may not full contact the backboard. In such cases, obtain the best measurement possible according to the protocol.

Once positioned, lower the stadiometer headpiece so that it rests firmly on top of the participant's head, with sufficient pressure to compress the hair. Instruct the participant to stand as tall as possible, take a deep breath, and hold this position. Taking a deep breath helps straighten the spine and yields a more consistent and reproducible stature measurement. You may notice that inhalation causes the headpiece to rise slightly.

As soon as the participant inhales and holds the position, record the measurement. After recording, instruct the participant to relax. Raise the stadiometer headpiece and have the participant step away from the stadiometer.

Adjustments for hair: If participants are unable to remove braids, buns, or headwear that interferes with the measurement, measure the distance from the scalp to the top of the hair using a small ruler, to the nearest 0.1 cm. Subtract this distance from the original stature measurement to obtain a corrected height value.

Adapted from the NHANES Anthropometry Procedures Manual (CDC, 2007).

28 Weight (in kg):

Ask the participant to stand on the scale with feet evenly distributed on the platform and maintain a straight, upright posture with arms hanging naturally at their sides. Instruct the participant to remain still and wait for the scale to stabilize. Record the displayed weight once it is steady.

Body Composition

The preferred method for body composition assessment in the lab is dual-energy X-ray absorptiometry (DXA), as it provides both whole-body and regional measurements with available normative references. If using bioelectrical impedance analysis (BIA), first calibrate the device using a 5 kg or 10 kg reference weight. After entering the participant's age, gender, and height, instruct them to stand barefoot on the foot conductors and to firmly grip the hand-held conductors. The participant's arms should be extended straight down and slightly forward, without touching the body.

Fat %:**Muscle %:****BMI:****Protocol references**

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Acknowledgements

The Somatomap Software used in this research was created by Jamie D. Feusner, Armen C. Arevian, and Nanthia Suthana (UCLA); and Sahib S. Khalsa and Christina Ralph-Nearman (Laureate Institute for Brain Research). © 2023 UCLA. Originally published in JMIR Mental Health (<http://mental.jmir.org>), 29.10.2019. Ralph-Nearman, C., Arevian, A. C., Puhl, M., Kumar, R., Villaroman, D., Suthana, N., Feusner, J. D., & Khalsa, S. S. (2019). A Novel Mobile Tool (Somatomap) to Assess Body Image Perception Pilot Tested With Fashion Models and Nonmodels: Cross-Sectional Study. *JMIR mental health*, 6(10), e14115. <https://doi.org/10.2196/14115>