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Twenty-Three Body Measurements for the Somatomap App

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DISCLAIMER

We are not responsible for the accuracy and reliability of users. Anyone who uses this protocol should undergo proper training and should establish inter-rater reliability.

ABSTRACT

The present protocol describes the standardized measurements for the 23 body parts corresponding to the *Somatomap 3D application. Somatomap 3D* is a digital avatar tool which enables one to alter the size/shape of 23 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.

GUIDELINES

- After reviewing the protocol measurement details, you will take the participant's measurements using a tape measure and stadiometer.
- Ensure to have the participants stand looking ahead of them.
- Ensure you have the hardcopy of the protocol measurements on hand and follow them.
- Record all measurements on the Microsoft Excel spreadsheet.
- Make sure that you pull the tape measure snug and evenly across the body (horizontally) for precise measurements to the 1 cm.
- Make sure to measure at 0 or at the end of the tape measure, depending on where 0 starts on the tape measure you are using.
- Take the measurements on both right and left sides to obtain the mean.

MANUSCRIPT CITATION:
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).

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MATERIALS

1. Measuring Tape
2. Stadiometer

BEFORE START INSTRUCTIONS

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 the arms hanging naturally at the sides of the body and
  the feet parallel to each other on the ground.
- Ask the participant to take a deep breath and release the breath, and then note the measurements in this relaxed state.

Standard Protocol Measurement

23m

1 Neck Height:

1m

Ask the participant to tilt their head backward and look up. Measure from the suprasternal notch to the angle of the mandible.

2 **Neck Circumference:** 1m

Ask the participant to look straight ahead of them. Measure the circumference at the 1/2-way-point of the neck height, as defined above.

3 **Shoulder Width:** 1m

Measure from the most lateral portion of the acromion process across the front of the upper chest to the other most lateral portion of the acromion process. The acromion process is the bony prominence at the highest point of the shoulder.

4 **Bust Girth:** 1m

Measure horizontally around the participant's back and chest, aligning the tape at the level of the nipples. Arms should be hanging naturally at the sides in a relaxed position.

5 **Chest Girth:** 1m

Measure horizontally around the participant's back and upper chest, aligning the tape at the level of the axilla. Arms should be hanging naturally at the sides in a relaxed position.

6 **Abdomen Protrusion:** 1m

Measure the length along the curvature of the abdomen at the midline, extending from the xiphoid process to the top-most portion of the pubic symphysis. Arms should be hanging naturally at the sides in a relaxed position.

7 **Waist:** 1m

Measure the circumference at the 1/2-way-point between the lowest rib and the highest point of the iliac crest (typically at the navel) at the end of the participant's normal expiration. Arms should be hanging naturally at the sides in a relaxed position.

8 **Buttocks (Hip) Circumference:** 1m

Measure horizontally around the body at the level of the furthest protrusion of the buttocks.

9 **Upper Arm Length:** 1m

Measure vertically from the acromion process (bony prominence at the highest point of the shoulder) to the olecranon (bony prominence of the elbow). Arms should be hanging naturally at the sides in a relaxed position.

10 **Upper Arm Girth (bicep):** 1m

Measure the circumference at the 1/2-way-point between the acromion process (bony prominence at the highest point of the shoulder) and the olecranon (bony prominence of the elbow). Arms should be hanging naturally at the sides in a relaxed position.

11 **Lower Arm Length:** 1m

Measure vertically from the olecranon (bony prominence of the elbow) to the crease of the wrist at the base of the hand on the palmar side. Arms should be hanging naturally at the sides in a relaxed position.

12 **Lower Arm Girth:** 1m

Measure the circumference at the 1/2-way-point between the olecranon (bony prominence of the elbow) and the crease of the wrist at the base of the hand on the palmar side. Arms should be hanging naturally at the sides in a relaxed position.

13 **Wrist Circumference:** 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.

14 **Hand Width:** 1m

Measure horizontally above the base of the thumb across the palm.

15 **Hand Length:** 1m

Measure vertically from the top of the middle finger to the first wrist crease on the palmar side.

16 **Torso Height:** 1m

Ask the participant to tilt their head forward and to place their hands on their iliac crests. 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.

17 **Thigh Height:** 1m

Measure vertically from the iliac crest to the top of the patella (commonly known as the kneecap).

18 **Thigh Girth:** 1m

Measure the circumference at the 1/2-way-point of the thigh height.

19 **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).

20 **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.

21 **Ankle Circumference:** 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.

22 **Feet Width:** 1m

Measure horizontally across the widest part of the foot (typically across the ball of the foot).

23 **Feet Length:** 1m

Measure vertically from the longest toe (typically the big toe or second toe) to the back of the heel.

Additional Body Measurments 2m

24 **Height (in cm):** 1m

Ask the participant to remove hair ornaments, jewelry, buns, or braids from the top of the head that interfere with the measurement. Shoes and socks should be removed. Ask the participant to stand straight against the backboard with the body weight evenly distributed and both feet flat on the stadiometer platform. The participants' feet should be positioned with the heels together and toes

pointed slightly outward at approximately 160-degree angle. Check to be sure that the back of the head, shoulder blades, buttocks, and heels make contact with the backboard of the stadiometer.

NOTE: Depending on the overall body conformation of the individual, all four contact points - head, shoulders, buttocks, and heels - may or may not touch the stadiometer backboard. In such instances, it is important to 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 survey participant to stand as tall as possible, take a deep breath, and hold this position. The act of taking a deep breath helps straighten the spine to yield a more consistent and reproducible stature measurement. Notice that the inhalation will cause the headpiece to rise slightly.

As soon as the participant inhales, record the measurement. After recording the measurement, tell the participant to relax. Once the measurement is taken, raise the stadiometer headpiece and have the participant step away from the stadiometer.

Adjustments for hair: When participants cannot remove hair braids, buns, and headwear that interferes with the stature measurement, measure the distance from the scalp to the top of the hair with a small ruler to the nearest 0.1 cm. A corrected height value can be calculated by subtracting these distances from the original stature measurement, thus yielding an adjusted stature value.

25 **Weight (in lbs):** 1m

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

Body Composition:

The most recommended body composition measurement in the lab is DXA, as whole body and regional measures may be made, along with available normative references. If using bioelectrical impedance analysis (BIA), first use a 5kg or 10kg weight to calibrate the machine. Then after inputting age, gender, and height, make sure that participants stand bare foot directly on top of the foot conductors, and firmly grip the hand-held conductors, with arms straight down and out in front of their body (not touching their body).

Fat %:

Muscle %:

BMI: