



PROCEDURES MANUAL

BODY COMPOSITION

NOVEMBER 3, 2005

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1. INTRODUCTION

Height, weight, and triceps skinfold body composition measures will be assessed in all TAAG girls. These will provide the study with accurate measures of fat-free mass and percent fat using the study's prediction equation.

2. EQUIPMENT

The following equipment and supplies are needed:

- Shorr Height board (provided by CSCC)
- Seca Model 880 weight scale (provided by CSCC)
- ½" plywood square (bigger than scale)
- Extra AA batteries for scale
- Large skinfold calipers (provided by CSCC)
- String or tape measure
- Calculator
- Surgical Marking pen (not grease pencil)
- Wipes (alcohol or other – to wipe marks off of arms)
- Shorts/short sleeve T-shirts for participants if needed
- 5 kg calibration weight for scale
- 1 calibration block for calipers
- Low footstool
- Basket for emptying pockets and removing hand jewelry (for students)
- Pens, clipboards
- Small trash bag/trash can
- Privacy screens
- Appropriate number of data collection forms (MBC)
- Calibration logs for scale and caliper
- Lists and labels generated and printed at each site from the DMS

Note: Please number all scales and calipers for identification on the calibration log.

3. TRAINING AND CERTIFICATION FOR BODY COMPOSITION

All data collectors taking height and weight measurements must be certified by successfully completing training requirements. Training and practice sessions will be conducted prior to certification. Trainers for body composition will be certified at the central training in Tucson on October 26-28, 2005. This will follow a train-the-trainers model. Local training sessions are to be administered (taught) by individuals who have attended and successfully completed the central training. All data collectors must have attended at least one of these training sessions. Locally, all data collectors taking height, weight, and triceps measurements must be either trained and certified, or recertified if they have been certified in a previous TAAG training.

Certification testing requires a minimum of 6 individuals to be measured by both the trainer (expert) and each training participant. Agreement between the expert and trainees must be less than 0.5 kg for weight among 5 of the 6 subjects. For height and skin fold measurements, there are two criteria for certifying.

Height

- (a) agreement between the expert and trainees must be less than 1 cm for height $\{|\text{height}_{(\text{trainee})} - \text{height}_{(\text{expert})}| < 1.0 \text{ cm}\}$ among 5 of the 6 subjects AND
- (b) the mean height of the 6 subjects measured by the expert must be less than 0.5 cm of the mean height of the same 6 subjects measured by the trainee $\{|\text{meanheight}_{(\text{trainee})} - \text{meanheight}_{(\text{expert})}| < 0.5 \text{ cm}\}$.

Skin fold

- (c) the triceps skin fold that the trainee measures and the expert's triceps skin fold measurement must be less than 15% of each other $\{[\text{max} - \text{min} / \text{min}] < 0.15\}$ OR less than or equal to 2 mm of each subject among 5 of the 6 subjects AND
- (d) the trainee's mean of all 6 triceps skin fold measures and the expert's mean of the same 6 triceps skin fold measures must be less than 10% of each other $\{[\text{max}_{(\text{mean})} - \text{min}_{(\text{mean})} / \text{min}_{(\text{mean})}] < 0.10\}$.

NOTE: 'triceps skin fold' = the average over the three skin fold measurements on a subject. When averaging the three triceps measures, round to the nearest tenth (either XX.0, XX.3 or XX.7).

Data collectors who do not pass the certification test will have the opportunity for additional instruction and testing. One tip that will speed up the certification process is to have the trainees do their own averaging on the data collection form, off to the side. They can compute the mean height (rounded to the nearest even decimal, mean weight and mean tricep

Recorders are recommended during data collection. Experience has shown that using a recorder helps speed up the measurement process. Recorders are not required to be certified to take the measurements, but should be completely familiar with the data collection forms, edit requirements, and the measurement MOP.

4. BODY COMPOSITION DATA COLLECTION FORM (MBC)

The Body Composition data collection form (MBC) contains 1 page. There should be one MBC form for each girl participating in the data collection. Girl lists and labels are generated through the TAAG DMS (see Section 5).

The ethnicity question is self-reported by the girl. Some options for asking the question are 'Do you think of yourself as...[list options]' or 'Which of these is most like you? [list options]'. The girls can report all that apply.

Space is provided on the MBC to record across (not down) the two trials of height measurement, the two trials of weight measurement, and the three trials of each triceps measurement for each subject. Trials are repeated when the repeat measurements do not meet the edit specifications of agreement, indicated on the form in each section. For height, repeat the two measurements if the difference between the two trials is equal to or greater than 1 cm. For weight, repeat the two measurements if the difference between the two trials is equal to or greater than 0.5 kg. For triceps skinfold, repeat the three measurements if $(\text{maximum} - \text{minimum}) / \text{minimum} \geq 0.20$.

Ensuring that this accuracy is met is the responsibility of the measurer recording the data. Failure to meet the edit specification requires that the full set of measurements (2 or 3 trials) be remade. When a measurement must be repeated, mark a line through the two (or three) trials and go to the next line and complete both (or all three) trials again. There are places on the data collection form for repeating measurements in the event that an edit check fails and the measurements must be repeated.

The comment section of the form should be used to note any observation or occurrence during data collection the measurer thinks may have effected the actual measurement, or explain a missing measurement. This would include deformities, clothing restrictions, hairdo restrictions, student refusal, etc.

5. LABELS

Labels of consented and randomized girls are available through the TAAG DMS. Since the activity monitor data collection and the body composition measures are paired at the first visit, labels are provided for both procedures.

Each girl will have 6 labels. The first label is not used and just provides documentation of each girl on the list. The first and second contains the girls name and ID number, the second is used as a nametag for each girl. The third contains only the ID number and is placed on the MBC form. The fourth label is to be used for girls selected for body composition Quality Control (QC) forms. The fifth and sixth labels are used for activity monitor data collection (see ActiGraph Activity Monitor MOP).

6. CONFIDENTIALITY CONSIDERATIONS

Each student being measured has the right to confidentiality. No form is identified with a student's name. Every effort should be made to keep observations and data recording as objective and non-judgmental as possible. Triceps skinfolds can range anywhere from 5mm to 50mm. It is important to not react to any measure, simply observe and record on the form. The staff should be pleasant and respectful to each student who participates in the study and make the experience a positive one for the girls.

Communication among staff during measurements should be done in a quiet and respectful manner so that participants cannot overhear any discussion related to results. It is likely that many participants will ask to be told their measurements results. Height and weight measurements can be easily shown to the participant in a discreet way. However, the skinfold measurement would require explanations that staff will not be trained to provide, and which may not be understood by the participants. If these measurement results are requested, explain to the participant that these individual results have no meaning individually in the way height and weight does. You may show them the numbers, but tell them that you do not know what they mean, that they are all used together as pieces in the analysis of the study.

7. SAFETY CONSIDERATIONS

It is important to be careful with the use of pens and pencils while taking measurements. Measurers should remove rings, bracelets, or other jewelry that could pose a hazard. Measurers should introduce themselves to the child and carefully explain all procedures to her.

If a participant has physical injuries or deformities such that a measurement cannot be taken, or the protocol cannot be followed (e.g., triceps measurements on the right side), the injury or deformity should be noted on the data collection form on the comments section, and measurements should be made as much as possible (e.g., measure the left side).

8. QUALITY CONTROL PROCEDURES

8.1. General QC Procedures

Each day before measurements are taken, members of the Measurement Team are to practice taking measurements on each other, with the Team Leader observing to ensure proper technique. During the measurements, monitoring is ongoing by the recorder, who can provide corrective directions when deviations from protocol are observed.

Quality control data is collected by repeating measurements on every 20th girl in order to assess inter-observer reliability. Every 20th girl measured should move from their original station to a different station set up for measurements in order that the repeat measurement is taken by a team leader or measurement coordinator. If the team leader is not available, then use another measurer as the QC measure. QC data should be recorded on a separate MBC form, designated as Seq # = 002 to designate it as a QC measurement. One of the two forms must be sequence 002, but it is not mandatory that the sequence 002 is the gold standard and the 001 is the original measure.

Measurements taken as QC should be made without knowledge of the original measure. The original measurer should not know in advance that a subject he/she is measuring is going to serve as the QC subject. It is acceptable for the registration person and/or the Team Leader to know in advance which subject will provide the QC measure. The QC data should be compared with the original measure by the measurement team leader, using the averages of the repeat trials from each form. These averages should match the edit specs of the measurement (less than 1cm difference for height, less than 0.5kg difference for weight, and less than 20% difference between the maximum and minimum measures for skinfolds). In the event that there is disagreement, one of the following solutions should take place, with the first option the preferred method, and the final option as a last resort.

1. Field staff (original measurer) should be reassigned activities for the remainder of the day. Another field staff who is certified to measure triceps steps in. Practice and recertification will be required before the field staff can do triceps measurements again.
2. If the only other field staff available and certified to measure triceps is a male, then allow him to measure triceps for the remainder of the day, under supervision. Practice and recertification is required before the field staff can do triceps measurements again.
3. If neither of the above two options is possible, then allow the field staff (original measurer) who was not in agreement with the gold standard to continue to measure that day. For every triceps measurement that is made by the field staff after the QC failure, the team leader or field staff will write in the comments section of each form: "TRICEPS QC FAILED TODAY" in order to flag the data.

8.2. Skinfold QC Procedures

1. Each site will designate a person or persons as the skinfold gold standard. This person(s) must attend the central training and pass skinfold certification. They will be responsible for conducting local training, certification, and quality assurance.
2. All field technicians must attend local training and pass certification as specified in the body composition training protocol.
3. Inter-measurer comparisons will be made at regular intervals, comparing field technicians against the gold standard, to monitor skinfold quality assurance and guard against “drift.” For every 20th child measured, that child must also be measured by the gold standard for quality assurance.
4. The technician’s score (average of 3 trials) must be less than 20% different from the gold standard’s score (average of 3 trials). The formula for this is

$$|[(\text{technician score} - \text{gold standard score})/\text{gold standard score}]| < 0.20.$$

If the scores are greater than or equal to 20%, the technician must repeat the training, and meet the 20% recertification criteria on three subjects also measured by the gold standard. In other words, to recertify in skinfolds after failing to agree with the gold standard, the technician goes through some retraining and then measures (in triplicate) the triceps skinfold of three subjects. The gold standard must also measure the triceps skinfold of the same three subjects. Then, the average triceps skinfold for each subject measured by the technician must be less than 20% of the average by the gold standard. The retraining may be done at school with available girls or in the laboratory with adolescents or adults as subjects, as long as the adults are similar in size (skinfold thickness) to adolescents. It is preferable to have three subjects of varying size (below average, average, above average skinfold thicknesses), selected to span the range of adolescent skinfold thickness.

In the event that the gold standard is not in the school, the inter-measurer comparison is completed by having a second technician measure the child. If the two technicians do not have less than 20% difference, both must repeat training and recertification. This is the less preferred option, as it would require at least three certified skinfold technicians in the school in the event of a failed comparison.

When recertification/retraining is done, the difference between the technician and gold standard must be less than 20% on each of the three subjects. In the event that disagreement occurs on one of three subjects, a fourth subject of similar size may be measured by the technician and gold standard. If disagreement occurs on more than one subject the technician must repeat the training and pass certification on a second group of three subjects (passing on all three subjects).

5. Technicians may not return to skinfold measurements until the certification process is complete (see items 1 – 3 in section 8.1 above for details).

9. GENERAL MEASUREMENT PROCEDURES

9.1. Measurement Stations

The measurement teams can decide how best to organize themselves at the school. It is recommended that one staff member serve as a registration person, giving each girl her nametag (with her name and TAAG ID number) to wear, labeling her MBC form, and giving each girl a clipboard with her labeled form and the set of extra labels for use on the activity monitor. Each team can also decide on how they want to organize their stations. It is possible to do all 3 measurements at one station; this is much quicker with a recorder present. The number of stations set up can be determined by the team staffing. In this scenario, it is recommended that skinfold, height and weight, and measurements would alternate until the edit specifications for each are met.

Another scenario would be to set up a combined height and weight station, and a separate skinfold station. Again, depending on team staffing, there could be more than one set of stations. Alternating the different measurements within trials is recommended as much as the station set-up will allow.

At the stations, the measuring board and scale should be placed on a firm (uncarpeted), level floor for accurate measurements. Use of ½” plywood cut larger than the scale will provide a firm surface.

9.2. Privacy

The girl’s privacy should be respected. Even though the settings for these physical measures may be slightly different among the Field Centers, care should be given that the physical measures are taken in a private area. Privacy also involves sound, so it is important that observers not speak values aloud in a way that could be heard by others nearby.

To ensure that the girl’s modesty is respected during anthropometrics measurements, only female staff perform these tasks and always in the presence of another person. Privacy screens should be used for measurements when appropriate.

9.3. Subject Preparations

The girls should be asked to remove any excess clothing (sweatshirts, sweaters, or jackets) and should be barefoot or wearing socks. The girls should also be asked to remove any items from their pockets and temporarily place them in baskets provided. Watches, belts, necklaces and other jewelry that is of considerable weight should be removed before taking the weight measurement.

For height measurements, girls will be asked to remove their eyeglasses. If the subject has a hair accessory or hairstyle which interferes with the measurement, she will be asked to remove the accessory or change her hairstyle (e.g., take out ponytail band). If the subject refuses to comply with regard to hairstyle or accessory, then she will still be measured, following the procedure in Section 12. The measurer will make a note in the comment section of the data collection form, stating ‘inflexible hairdo.’

9.4. Equipment Calibration

At the beginning of each measurement day, before measurements begin, the Seca weight scale and skinfold calipers must be calibrated by the Measurement Team Leader. The Seca scale is also required to be calibrated anytime the scale is moved. If either instrument is not in calibration, it may not be used for measurement. Each site will keep a log in order to record the results of the calibrations (Appendices A & B). This log will contain the calibration history of each piece of equipment, and must be sent to the Coordinating Center at the end of the measurement period to provide documentation of machine precision monitoring during the study.

An additional caliper and scale are available for each team and it is the responsibility of the Measurement Coordinator to make sure that replacements are available. It is essential that any defective equipment be immediately repaired with instructions from the Coordinating Center.

Scale Calibration:

Calibration of the Seca scale is obtained by using a 5 kg weight; a scale that is off by more than 0.3 kg cannot be used. Calibration results are to be recorded onto the Seca Scale Calibration log daily.

Lange Caliper Calibration:

Each caliper used in the study must measure at “zero”. This means that ‘at rest’ the caliper needle must read less than 1mm. If the caliper reads 1mm or more, it cannot be used. Calibration is obtained by an initial measurement of a calibration block at the beginning of the measurement period. All subsequent measures of the calibration block must be within +/- 1 mm, or it cannot be used. Calibration results are to be recorded onto the Caliper Calibration Log daily, at each of the 5 settings (10, 20, 30, 40, and 50mm).

10. WEIGHT MEASUREMENT

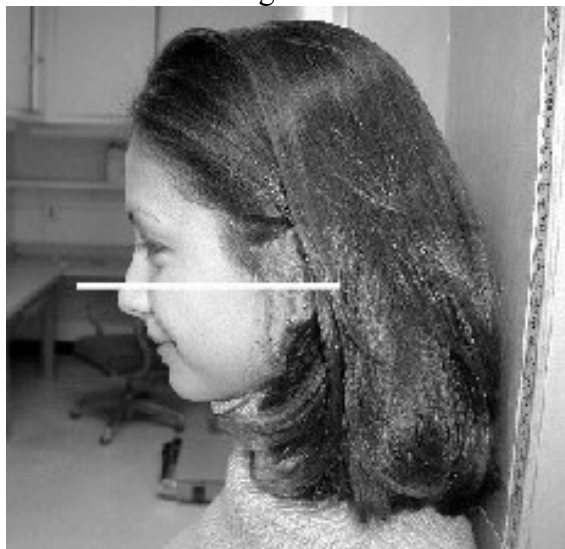
- a. Lightly tap the top of the scale with your toe. The scale should read ‘0.0’.
- b. Make sure the scale is reading in kg. The scale should read ‘0.0’ before the subject steps on the scale.
- c. The subject stands still over the center of the scale with the body weight evenly distributed over feet, feet evenly positioned side by side in the middle of the scale, and the arms hanging freely by the sides of the body. The subject should be barefoot or wearing socks. The subject should hold the head up and facing forward. Girls will invariably look down as you are measuring their weight. Have the girl look straight ahead. You can put a dot or poster on the wall for the girl to look at. Make sure the subject is not leaning to one side and that the head is held stationary.
- d. If the measurement drastically fluctuates while the girl is standing on the scale, she may not be standing in the exact middle of the scale base with her feet evenly and comfortably positioned next to each other, or the floor may be uneven. The further the center of weight is from the exact center of the base, the more likely the scale reading will fluctuate. This is more likely to happen with heavier and/or taller girls. If the weight bounces between .1kg and won’t stabilize (e.g, 45.5-45.6), use the even number in the decimal place (45.6).
- e. When the digital readout is stable, record the weight to the nearest 0.1 kg.
- f. Repeat measurement process.

- g. If the two measurements of weight differ by 0.5 kg or more, then both weight measurements (trials) must be repeated.

11. HEIGHT MEASUREMENT

- a. Have the Shorr board all put together and set up flush against a wall. Make every attempt to find a space where there is no baseboard or shoe molding or chair rail. Remember to remove the carrying strap before measurements.
- b. Make sure the subject's shoes and glasses are off and that there is nothing tied around the subjects waist (sweatshirt, sweater, etc). Have the subject back up inside the height board. The weight of the subject is distributed evenly on both feet. The arms hang freely by the sides of the body, with the palms facing the thighs. The subject is asked to place the ankles or knees together, whichever comes together first (often they will come together simultaneously). If the subject has knock-knees, the feet are separated so that the medial borders of the knees are in contact but not overlapping. The scapulae and buttocks are in contact with the vertical board if possible, or whichever part of the body touches the board first. The subject will be standing erect with the mid-axillary line perpendicular to the floor. Verify on the left side of the body. The heels, buttocks, scapulae, and the posterior aspect of the cranium (head) of some subjects cannot be placed in one vertical plane while maintaining a reasonable natural stance. These subjects are positioned so that only the buttocks and the heels or the cranium are in contact with the vertical board.
- c. The subject's head is positioned in the Frankfurt Horizontal plane. If necessary, ask the girl to tuck her hair behind her ear so that the external opening in the ear can be in clear view. In this position an imaginary line can be drawn from the bottom of the eye socket (orbital margin) to the middle of the external opening of the ear (external auditory canal). Measure from the center of the external opening of the ear. See Figure 1.

Figure 1.



- d. Ask the subject, "Hold your head very still, take a deep breath in and keep standing up straight." She needs to maintain a fully erect position without altering the load on the heels. Reposition the head in the Frankfurt plane if necessary. The moveable headboard

is brought onto the most superior point on the head with sufficient pressure to compress the hair. (Holding a deep breath makes the girl stand up straighter and taller, and allows for a more stable and reliable reading.)

- e. The measurement is recorded to the nearest 0.1 cm. Tell the subject she can release her breath.
- f. The subject is asked to step away from the board, and the measurement is repeated as above.
- g. If the 2 measurements differ by 1.0 cm or more, then both measures must be repeated.

12. HEIGHT MEASUREMENT WITH INFLEXIBLE HAIRDOS

There may be occasions when a girl's hairdo is inflexible, cannot be "taken down," and interferes with the measurement of standing height. If the hairdo appears to be less than $\frac{1}{2}$ cm above the top of her head, measure her height according to the standard protocol by compressing the hairdo down with the sliding part of the height board as far as you can without making the subject uncomfortable. An example of this would be a subject who has cornrows in her hair. On those occasions where the hairdo is higher than $\frac{1}{2}$ cm and is inflexible, follow the modified procedure for measuring height outlined below:

- a. Ask the girl if she is willing to take down the hairstyle, and if she is willing, follow the standard protocol for measuring height. If she is unwilling or unable to comply, invite her for a make up height measurement on another day, and remind her of a desirable hairstyle for that day.
Even if she is willing to return another day, proceed with the height measurement to avoid potential missing data. If you do go back and measure the girls another day by our standard protocol with a flexible hairdo, cross out the inflexible readings and put the new data in the 'b.' trial on the same MBC form.
- b. Position the girl on the Shorr height board according to the standard protocol.
- c. With the head in the Frankfurt plane, and viewing the head from the side, identify as accurately as possible the crown (i.e., the highest point of the skull, where height would usually be measured). It may help to palpate the top of the head, around the inflexible hairdo. Ask permission to touch the girl. If the hairdo covers the crown, palpate around the hairdo and "estimate" the location of the crown. If you are unable to tell where the crown is, ask the girl to locate it. Make the best guess you can.

- d. Position a straight edge adjacent to the crown, parallel to the floor, along the level of the crown, so that the end contacts the tape measure on the Shorr board. See Figure 2.

Figure 2.



- e. If the girl's hair is in a bun that cannot be removed and that prevents her head from being held straight when her body is flush with the board, have her stand away from the board, getting as close to the board as she can while able to hold her head straight. Verify vertical alignment of her body, adjust her head into the Frankfurt plane, and then measure her height using the movable headboard.
- f. Read and record height according to the standard protocol.
- g. Repeat the procedure until the two trials meet the edit specifications.
- h. Note in the comments section of the MBC form "inflexible hairdo."

13. TRICEPS SKINFOLD MEASUREMENT

- a. Skinfolts are measured on the right side of the body. If a participant has physical injuries or deformities such that the right side cannot be measured, measure the left side. The injury or deformity should be noted on the Body Composition Form (MBC) in the comments section.
- b. Skinfold measurements are measured and recorded to the nearest millimeter. All measurements should be rounded to the nearest millimeter. When the measurement falls exactly between two whole numbers (e.g., 22.5 mm), then round to the nearest even whole number (e.g., 22). Both 11.5 and 12.5 would be rounded to 12.
- c. The triceps skinfold is located on the middle of the back of the right arm. The triceps skinfold is measured in the midline of the posterior aspect (back) of the arm, over the triceps muscle, at a point midway between the lateral projection of the acromion process

of the scapula (shoulder blade) and the inferior margin (bottom) of the olecranon process of the ulna (elbow). The level of measurement is determined by measuring the distance between the lateral projection of the acromial process and the inferior border of the olecranon process of the ulna, with the elbow flexed to 90°. To find the midpoint, stretch a piece of string from the acromion process (top outside edge of the shoulder) to the olecranon process (elbow). Grasp the string at the bottom end (point where it touches the olecranon) and loop it up to the top end (point where it touches the acromion). Mark the midpoint with a water-soluble colored marker or a sticky dot on the lateral side of the upper arm at the level of the bottom of the looped string (the midpoint). See Figure 3.

- d. Next, mark a second spot, the place where the skinfold measure will be taken, by moving in a parallel line from the first spot on the **side** of the arm around to the **back** of the arm. You can use the string to be sure the line is level. It is important to be eye-level with the two marked spots to be sure they create a line that is level (parallel) with the floor. The mark should be in the middle of the back of the arm (width-wise), directly over the tricep muscle.

Figure 3.



- e. The subject is measured standing. Make sure the arm is relaxed. The skinfold is measured with the arm hanging loosely and comfortably at the subject's side. See Figure 4. The measurer stands behind the subject, places the palm of her left hand on the subject's arm proximal to the marked level, with the thumb and index finger directed inferiorly (below). The triceps skinfold is picked up with the left thumb and index finger, approximately 1 cm proximal (above) to the marked level. If you are unable to tell if you have muscle in the fold as well as fat, have the subject make a muscle in her arm. If you feel some of the skinfold pull away, then you need to pinch a smaller fold because the grasp was too big.

Figure 4.



- f. The site of measurement must be in the midline. The tips of the calipers are applied to the skinfold at the marked level and held for 2-3 seconds, with the thumb all the way off the lever.
- g. Tell the girl she may feel a slight pinch (you can show her what it feels like on her finger if she is nervous).
- h. Take the reading, release your hold and the caliper from the skinfold and record the measure on the form.
- i. Repeat the measurement using the location mark. Do this two more times for a total of three measures. If you are rotating between skinfold, height and weight stations, move to another station and come back to measure her skinfold later.
- j. The measurements are repeated in sets of three rotational trials until the difference between the maximum and minimum scores is < 20%. To calculate this difference, use the following: $((\text{maximum} - \text{minimum}) / \text{minimum}) * 100$.

14. DATA PROCESSING

All collected MBCs should be reviewed for completeness and legibility by each Team Leader and then given to the Data Manager at each site for data entry. All MBC forms must be entered in the DMS within 2 weeks of data collection. Team Leaders are to report to their Measurement Coordinator on the number of girls measured at the school, and any measurement or QC problems.

DATA ENTRY NOTE: There are height, weight, and skinfold range restrictions in the DMS. These are in place to decrease data entry errors. However, there have been some cases where a girl's measurements fall outside of this range. In this case, the "confirm" option on the "problem" menu should be used to confirm that the value entered is correct. By "confirming" the value, it will be accepted in the DMS. Do NOT leave the field blank and enter the value in a notelog.

Site: _____

**APPENDIX B.
TAAG LANGE CALIPER CALIBRATION LOG**

Date	Caliper #	Width (mm)	Value	Comments
		10		
		20		
		30		
		40		
		50		
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		50		

APPENDIX C.
HEIGHT, WEIGHT AND SKIN FOLD MEASUREMENT SCRIPT

Now I am going to take your height, weight, and body composition measurements. We are going to do height and weight measurements twice and the tricep measurement three times. Please remove everything from your pockets and any large or heavy jewelry and put everything in this basket. Also, please remove your shoes. [If the girl is wearing a sweater, sweatshirt, or jacket over her shirt, ask her to remove it also to reduce excess weight.]

[TRICEP MEASUREMENT]

Now we are going to take a tricep measurement on your right arm. Face away from me with your right arm next to your body, bent at a 90-degree angle. I am going to make two marks on your arm, but the markers we are using will wipe off with this handy wipe. Is it all right if I touch your arm so I can find my placement for the measurement? I am going to lightly pinch the skin on the back of your arm three times.

[You may want to ask the girl if she want to see how the caliper pinch will feel on her finger before you pinch the back of her arm.]

Find your midpoint on the girl and mark it with your water-based marker following MOP protocol. With thumb and index finger pinch the skin fold approximately 1 cm above your midpoint mark. Make sure to have the girl flex her tricep to assure you are not including the muscle in your skin fold measure. Hold the skin fold with the calipers for 3 seconds, and take reading looking from the top of the caliper. Record the reading, or call it out loud to the recorder and make sure the recorder repeats the correct number back to you. Repeat this measure three times, releasing the skin fold all three times for each measure.]

[WEIGHT MEASUREMENT]

Now I will take your weight.

[Weight: start by tapping the scale to turn it on. When it shows zero (0.0), say:]

Please stand with your feet evenly spaced over the center of the scale. Make sure your weight is balanced between your two feet. Keep your hands at your sides and look straight ahead [at the sticker or poster on the wall].

[Record weight after it stabilizes.]

Okay, you may step off the scale.

[HEIGHT MEASUREMENT]

Now we are going to measure your height.

[If the girl has a hair accessory or her hair is up, please ask her to remove it. If it would be too difficult to remove or if she refuses, allow her to keep it in, and press the hair down as much as you can when performing the measure. Or, follow the instructions in Section 12 – “Measuring height with inflexible hairdos” and write in the comments on the form “inflexible hairdo.”]

Please step back onto the height board until some part of your body (heels, upper back, buttocks) touches the board and bring your feet together until your ankles or knees touch, whichever touch first. Stand straight up against the board. Your arms should be straight down at your sides, palms facing in. *[check that they are properly aligned, both from front and from left side.]*

Now, I am going to position your head.

[Position head so an imaginary horizontal line can be drawn between the bottom of eye socket and the opening of the ear.]

Please don't move your head until we finish. Now, hold your head still, keep your feet flat, and take a deep breath and hold it; stand up tall.

[Verify body is properly aligned and head position did not shift with deep breath. Move the headboard onto the head with sufficient pressure to compress hair. Record the height on the form.]

Now we are going to repeat each of the measures.

[Repeat all three measures: skinfold, weight, height, skinfold. Refer back to script above.]

[Verify that the measures for all 3 are within the accuracy specifications. If not, perform an additional set of measures as necessary.]

APPENDIX D. FREQUENTLY ASKED QUESTIONS

Q: [with regard to every 20th girl providing QC measures]: What if the 20th girl happens to be an alternate? Do you want us to somehow make sure we only measure the random 120 for QC? That could possibly affect the 20th girl scenario.

A.: We want to ensure that the girls selected for QC are random; i.e., there is no selection bias, and that we get QC measures on 5% of the girls in a school at the end of measurement. So by doing every 20th girl in a systematic, blinded way, regardless of whether she is R120 or alternate, should eliminate bias. Note that any girl with SEQ 002 will be included in the body composition quality control reporting. The number of QCs will be determined by the number of R120 girls that are measured at each school.

Q. If 128 girls are scheduled for measurement in a school, should I do 6 girls QC or 7?

A. QC does not have to be done by school. We are interested in getting QC measures on 'every 20th girl' and in the end, we review QC data by site and by treatment, not by school. However, it's okay to do QC by school, if it makes keeping track easier, but you would need to alternate between doing the smaller number (6) and the larger number (7) of QCs at each school so that the number of QCs comes out to be 5% of the measures in the end. In other words, in half the schools you 'round up,' the other half you 'round down.' Just make every effort not to round up only in the intervention and down only in the control, or vice versa.

Another option would be, in your example, re-measure 6 girls for QC, but then at the next school, start with #9, such that the 12th girl would be QC, instead of the 20th.

Q. How do I document a new serial number and on date for a girl who is being remeasured on Actigraph?

A. Enter a new MBC form with seqno=99 indicating the new on date and serial number.

**APPENDIX E.
MBC FORM**



To be completed by TAAG staff:			
Student ID: _____			
Form Code: MBC	Version: A	Series #: 41	Seq. #: ____

Body Composition and Activity Monitor Form

1. ActiGraph Serial Number: SN _____ 2. Today's Date: ____ / ____ / ____
mm dd yyyy

3. Ethnicity (optional - check all that apply):

- Caucasian (White, non-Hispanic)
- Black
- Hispanic
- Asian / Pacific Islander
- American Indian
- Other, specify: _____

4. Height (cm)

Measured by: _____ Recorded by: _____

Trial 1

Trial 2

a. _____

Repeat both heights if difference ≥ 1 cm.

b. _____

c. _____

5. Weight (kg)

Measured by: _____ Recorded by: _____

Trial 1

Trial 2

a. _____

Repeat both weights if difference ≥ 0.5 kg.

b. _____

c. _____

6. Triceps (mm)

Measured by: _____ Recorded by: _____

Trial 1

Trial 2

Trial 3

a. _____

Repeat all three skinfolds if the highest and lowest skinfolds differ by $\geq 20\%$ $[(max - min)/min \geq 0.20]$

b. _____

c. _____

7. Comments?
