

Attachment 38

Balance Accelerometer Measure (BAM)

Name of test: Balance Accelerometer Measure (BAM)

Estimated time burden: 5 minutes

Number of items: 6 tasks

Materials:

Laptop computer & mouse

Large room (at least 15' X 12')

Paper from adhesive flip chart (2' x 3') hung on wall with large X for adult participants or an attractive picture for child participants, placed one meter from the tip of the participant's big toe and at participant's eye level

Accelerometer unit – gait belt and sensor

Blue Airex foam

Description: This task is designed to assess postural sway and to determine participants' vestibulo-spinal function. Children ages 3-6 are asked to complete the first 4 poses; participants ages 7 years and older should complete all 6 poses.



Figure 1: Accelerometer unit attached to gait belt.

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Testing Procedure:

Participants are to stand in their stocking feet (no shoes). A chair should be placed behind the participant if rest is needed between trials. The examiner is to stand behind the participant (to the side of participants ages 3-12) to be ready to prevent the participant from falling. During testing, the laptop computer should be placed on a table in close proximity to the examiner. It is crucial that the laptop is never greater than 25 feet away from the accelerometer system (i.e., the belt unit the participant is wearing) during testing.

While putting the belt and accelerometer on the participant, say: **“This is a test of your balance. There are as many as 6 (or, for participants ages 3-6, 4) different poses that you will be asked to do. During each pose, you will be asked to stand as steady as possible for 45 seconds. You will have a second chance if you cannot hold the position for 45 seconds. Between each set of poses, you may rest in the chair if needed. Please try to do your best. I will demonstrate how I want you to stand before each task.”**

Each participant will be given up to 2 trials to be successful. The following guidelines should be used to stop a trial (i.e., evidence that the participant is no longer holding the pose):

1. If the arms come off the chest
2. If the knees bend
3. If the feet move out of original position (move or swivel out or are lifted)
4. If the participant bends forward at the waist (more than 45 degrees). If this happens, the examiner will have to support the participant with the belt
5. If the participant says something like: “I cannot do that” or “I do not feel safe trying that”

A second trial should be attempted if the first trial is not successfully completed; the examiner should stand close to the participant to prevent actual falls. Some participants will succeed on the second trial, even if they failed the first trial (particularly on the foam or in the tandem pose).

The task order is always the same: flat surface, feet together, eyes open; flat surface, feet together, eyes closed; on foam, feet together, eyes open; on foam, feet together, eyes closed; flat surface, tandem stance, eyes open; flat surface, tandem stance, eyes closed. The tandem stance positions are only given to ages 7 and above. These poses are illustrated below with the instructions.

The examiner should proceed through each of the poses with the participant until the test is completed. After each trial or pose is completed, the examiner should ask: **“Are you ready for the next one?”**

If the participant says no or otherwise indicates that he/she needs to rest, say, **“Please sit in this chair to rest.”** The examiner should note the time the participant begins resting, because a maximum of one minute of rest is permitted.

Every 15 seconds or so, the examiner should ask, **“Are you ready to continue?”** If the participant indicates that he/she is ready, proceed with the next trial or pose. If the participant is not ready, wait and ask again in another 15 seconds.

If the participant is not ready by the end of the one-minute rest period, *the test is discontinued*. In such a case, the examiner should say, **“Let’s go on to another activity,”** and should note the reason for stopping the test on the examiner’s screen.



Pose 1: flat surface, feet together, eyes open

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The examiner should demonstrate the pose and then ask the participant to stand in the desired pose, saying: “Please stand with your feet together (heels & balls of feet touching) and as still as possible with your eyes open and with your arms crossed on your chest, like this (demonstrate for participant). Focus on the X (or picture) shown on the wall in front of you. Ready? Go.”

If the participant did not successfully complete the trial, the computer will then display trial 2 of this pose, and the examiner should say: “Let’s try that one again. Please stand with your feet together (heels & balls of feet touching) and as still as possible with your eyes open and with your arms crossed on your chest, like this (demonstrate for participant). Focus on the X (or picture) shown on the wall in front of you. Ready? Go.”

Once the participant successfully completes a trial, say, **“Are you ready for the next one?”** Proceed with the next pose or allow the participant to rest, following the procedures noted above.

***Discontinue rule 1: If the participant cannot successfully complete either trial of pose 1, the test will be discontinued.**

Pose 2: Flat surface, feet together, eyes closed

Pose 2 is the same as Pose 1, except this time the participant’s eyes are closed. The examiner should demonstrate the pose and then ask the participant to stand in the desired pose, saying:

“Please stand with your feet together (heels & balls of feet touching) and as still as possible with your eyes *closed* and with your arms crossed on your chest, like this (demonstrate for participant). Ready? Go.”

If the participant did not successfully complete the trial, the computer will then display trial 2 of this pose, and the examiner should say: “Let’s try that one again. Please stand with your feet together (heels & balls of feet touching) and as still as possible with your eyes *closed* and with your arms crossed on your chest, like this (demonstrate for participant). Ready? Go.”

Once the participant successfully completes a trial, say, **“Are you ready for the next one?”** Proceed with the next pose or allow the participant to rest, following the procedures noted above.

***Discontinue rule 2:** *If the participant cannot successfully complete either trial of pose 2, he/she will not be asked to perform any more poses with eyes closed (i.e., will not be administered poses 4 or 6).*



Pose 3: foam surface, feet together, eyes open

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The examiner should pick up the blue pad and place it on the floor 1 meter in front of the X (or picture) on the wall. Place the rubber material under the blue pad so that it does not slip. The examiner should demonstrate the pose and then ask the participant to stand in the desired pose, saying: “Please step onto the foam and put your feet together (heels & balls of feet touching) and stand as still as possible with your eyes open and your arms crossed on your chest, like this (demonstrate for participant). Focus on the X (or picture) shown on the wall in front of you. Ready? Go.”

If the participant did not successfully complete the trial, the computer will then display trial 2 of this pose, and the examiner should say: “Let’s try that one again. Please step onto the foam and put your feet together (heels & balls of feet touching) and stand as still as possible with

your eyes open and your arms crossed on your chest, like this (demonstrate for participant).
Focus on the X (or picture) shown on the wall in front of you. Ready? Go.”

Once the participant successfully completes a trial, say, **“Are you ready for the next one?”**
Proceed with the next pose or allow the participant to rest, following the procedures noted above.

***Discontinue rule 3:** *If the participant cannot successfully complete either trial of pose 3, the test will skip ahead to pose 5.*

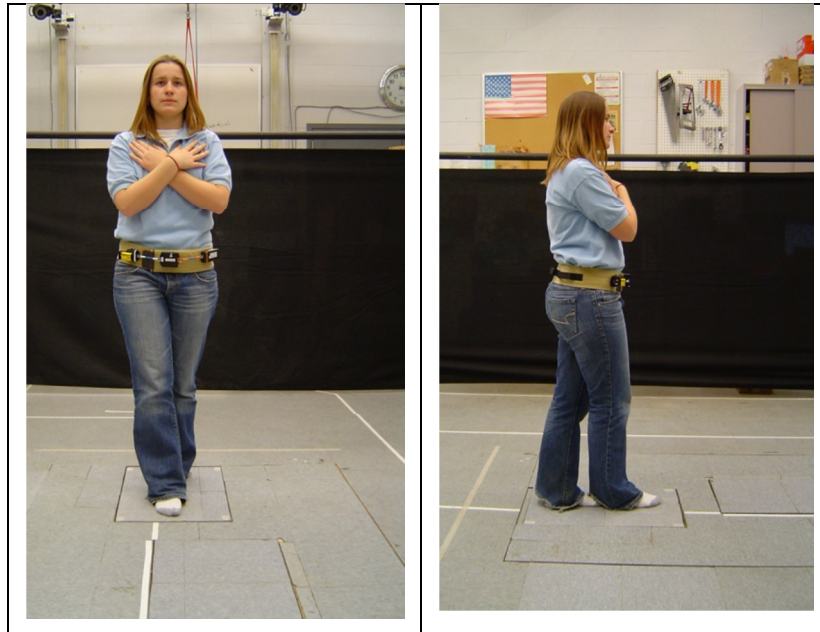
Pose 4: Foam surface, feet together, eyes closed

Pose 4 is the same as Pose 3 except that the participant’s eyes are closed. The examiner should demonstrate the pose and then ask the participant to stand in the desired pose, saying: “Please step onto the foam and put your feet together (heels & balls of feet touching) and stand as still as possible with your arms crossed on your chest, and then close your eyes, like this (demonstrate for participant). **Ready? Go.”**

If the participant did not successfully complete the trial, the computer will then display trial 2 of this pose, and the examiner should say: “Let’s try that one again. Please step onto the foam and put your feet together (heels & balls of feet touching) and stand as still as possible with your arms crossed on your chest, and then close your eyes, like this (demonstrate for participant). **Ready? Go.”**

Once the participant successfully completes a trial, say, **“Are you ready for the next one?”**
Proceed with the next pose or allow the participant to rest, following the procedures noted above.

***Discontinue rule 4:** *If the participant cannot successfully complete either trial of pose 4, he/she will not be administered pose 6.*



Pose 5: flat surface, tandem stance, eyes open

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The examiner should demonstrate the pose and then ask the participant to stand in the desired pose, saying: **“Please stand with the heel of one foot touching the toes of the other foot on the ground. Keep them in a straight line. Stand as still as possible with your eyes open and with your arms crossed on your chest, like this (demonstrate for participant). Focus on the X (or picture) shown on the wall in front of you. Ready? Go.”**

If the participant did not successfully complete the trial, the computer will then display trial 2 of this pose, and the examiner should say: “Let’s try that one again. Please stand with the heel of one foot touching the toes of the other foot on the ground. Keep them in a straight line. Stand as still as possible with your eyes open and with your arms crossed on your chest, like this (demonstrate for participant). Focus on the X (or picture) shown on the wall in front of you. Ready? Go.”

Once the participant successfully completes a trial, say, **“Are you ready for the next one?”** Proceed with the next pose or allow the participant to rest, following the procedures noted above.

****Discontinue rule 5: If the participant cannot successfully complete either trial of pose 5, the test will be discontinued.***

Pose 6: Flat surface, tandem stance, eyes closed

Pose 6 is the same as Pose 5 except that the participant’s eyes are closed. The examiner should demonstrate the pose and then ask the participant to stand in the desired pose, saying: “Please stand with the heel of one foot touching the toes of the other foot on the ground. Keep them in a straight line. Stand as still as possible with your eyes closed and with your arms crossed on your chest, like this (demonstrate for participant). Ready? Go.”

The examiner should immediately click the Start button and check the participant's posture. The computer screen will display the elapsed time of the trial so the examiner can easily see it while assuring the safety of the participant.

After 45 seconds, the program will show a window. Choose "Yes" if the participant was able to maintain balance for the full 45 seconds. Choose "No" if the participant did not successfully complete the trial for any reason.

If the participant did not successfully complete the trial, the computer will then display trial 2 of this pose, and the examiner should say: **"Let's try that one again. Please stand with the heel of one foot touching the toes of the other foot on the ground. Keep them in a straight line. Stand as still as possible with your eyes *closed* and with your arms crossed on your chest, like this** (demonstrate for participant). **Ready? Go."**

When the participant has completed pose 6 (or if Discontinue rules 1 or 5 are invoked), say, **"We are done with this activity."**