DOCUMENTATION

for

GAIT DATA

in

MIDUS REFRESHER BIOMARKER PROJECT (P4)

University of Wisconsin ♦ Institute on Aging
September 2017

INTRODUCTION

This document provides an overview of the gait data collected in the MIDUS-Refresher (MR) Biomarker Project (P4) data. This document describes the gait protocol and measures. Administrative and computed variables are also identified and information about the construction and usage of these variables is included.

Data users are also encouraged to review the Refresher Biomarker (P4) Readme Data File Notes. This document provides information about naming conventions, as well as administrative and filter variables included in the data file. It also includes information about how we handled missing values and other issues that arose over the course of the study. For example, there are instances when variables were added or sections of an instrument were expanded for data entry purposes to accommodate additional information provided by the respondent.

This document will be periodically revised and updated as more information is gathered, and researchers continue to work with the MIDUS-Refresher Biomarker data. If there are suggestions or comments, please contact midus_help@aging.wisc.edu.

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OVERVIEW OF DATA FILE AND COLLECTION PROTOCOLS

The MIDUS Biomarker Project (P4) assesses Gait using the APDM Mobility Lab System via 3 accelerometers attached at the ankles and lumbar spine. Data is streamed from the accelerometers to a dedicated laptop computer while participants walk back and forth at their usual pace along a straight 25 meter course for 2 minutes.

The gait assessment was added to the MIDUS Refresher as a pilot project conducted on at Site 2 (UW). The following describes the summary measures reported and the data collection protocol.

As described in the "MIDUS Refresher Biomarker Project (P4) Readme Data File Notes", naming convention organizes variables according to data type or the method used for data collection. Following this convention, the first four characters of the gait data are "RA4G".

Data Documentation

Data about the following gait characteristics are collected for each gait cycle.

- Stride Length – the distance between two consecutive footfalls at the moments of initial contacts.
- Stride Velocity – Walking speed
- ~~Cadence – Stepping rate, overall~~
- ~~Gait Cycle Time – Duration of a complete gait cycle in seconds~~
- ~~Double Support – Percentage of a gait cycle that both foot are on the ground~~
- Swing – Percentage of a gait cycle that either foot is off the ground
- Stance – Average percentage of a gait cycle that either foot is on the ground.

Measures for the above characteristics are reported separately for the right and left side which are then averaged to create a final summary measure. Note, height is not entered into the Mobility Lab software, thus Stride Length and Stride velocity are computed by the software as a % of stature/second.

Measures for the following gait characteristics are highly correlated. Thus, per APDM email correspondence with MIDUS (May 10, 2019) they are reported for the right foot gait cycle only.~~Measures for most of the above characteristics are reported separately for the right and left side which are then averaged to create a final summary measure.~~

- Cadence – Stepping rate, overall
- Gait Cycle Time – Duration of a complete gait cycle in seconds
- Double Support – Percentage of a gait cycle that both feet are on the ground

~~The exceptions are Cadence, Gait Cycle Time, and Double Support.~~ which ~~Per APDM correspondence with MIDUS from May 10, 2019, because these measures are highly correlated, they are reported for the right foot gait cycle only~~measure gait parameters that ~~cannot be meaningfully separated into right and left and thus only a final summary measure is reported for these two characteristics.~~

For all the above ~~we report~~ two summary measures are also reported:
- Mean – Average across all extracted gait cycles
- CoV – Coefficient of Variation calculated from all extracted gait cycles.

A flag variable (RA4GAVAIL) was also created and can be used to select the subset of cases for which gait data is available. This variable has the following codes:
- 1 = YES, Gait data available
- 2 = NO, Gait assessment could not be done due to technical difficulties
- 3 = R UNABLE TO DO, Participant unable to do assessment due to physical limitations/injuries.
- 9 = INAPP, Gait was only performed at UW. All Georgetown and UCLA cases are INAPP

The Gait data appear in the data file immediately after the musculoskeletal health data.

SECTION B

GAIT ASSESSMENT PROTOCOL

GAIT DATA COLLECTION PROTOCOL

The following identifies the equipment needed and provides instructions for obtaining Gait data using the APDM Mobility Lab System.

The Gait protocol is generally completed after the Psychophysiology protocol, mid-morning, on Day 2 of the respondent visit. However, it can be conducted on Day 1 if time permits.

Materials Needed
1. Laptop with APDM *Mobility Lab* software
2. Three Opal Monitors (2-ankle, 1-back).

ankle

back

3. DOCKING STATION with USB (micro connector) and power cables
4. ACCESS POINT (wireless receiver) and USB (boxy type-B connector) cable
5. Power source
6. Cart for transporting the Mobility Lab System and conducting Gait Analysis
7. USB/Jump drive for saving data.

PROTOCOL STEPS

Step 1: Placement of Opal Monitors
1. Remove the Opal Monitors from the DOCKING STATION. Confirm that the monitors are synchronized (i.e. blinking green in sync – this may take a few seconds) and that the ACCESS POINT is green, indicating a good signal.
2. Place the left leg monitor around the respondents left ankle (make sure that the green light is exposed and the USB port is on the bottom).

3. Place the right leg monitor around the respondents right ankle (make sure that the green light is exposed and the USB port is on the bottom).

4. Place the lumbar monitor on the respondent's lower lumbar/back (make sure that the green light is exposed and the USB port is on the bottom).

FRONT   BACK
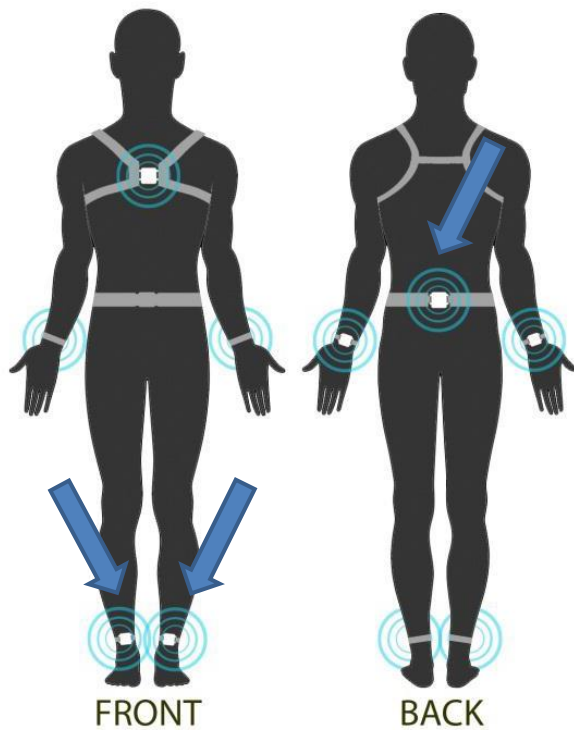
Note: *The order of monitor placement does not matter.*

**Step 2: Running the Timed Walk**

1. Show the respondent the starting and ending points of the 25 meter walking path, then ask him/her to stand at the starting point.

2. Speak the following out loud:

"When I say start, please walk at a natural and comfortable pace to the turning point. Once you have reached the end please turn around and return at the same pace. Continue to do this for 2 minutes. I will tell you when to stop."

2. When the respondent is ready and standing at the starting point, select **Start Trial** from within the **Trials** tab.
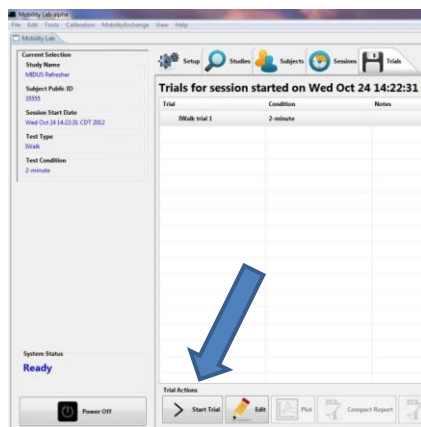
3. Wait for the sensors to synchronize.

4. Click Record and tell the respondent to start walking.

5. At the end of the 2 minute trial period, ask the respondent to stop walking. and select **Validate Data.**   (If the data are not useable you will receive an error message. If so, redo the trial. If you do not get any errors, select **Keep and Exit**.)

6. Remove the monitors and allow the respondent to return to his/her room.