

Explanatory Document: Accelerometry

1. Context and Study Procedures

Participants attending the study visit were offered the opportunity to take part in an accelerometer-based physical activity assessment at the end of the visit. Participation to this assessment was voluntary. All study participants who provided consent were eligible for inclusion in this examination.

For participants who agreed to participate:

- A study nurse provided a waist-worn accelerometer that had been initialized on the same morning as the study visit.
- Participants were instructed to wear the accelerometer for 8 consecutive days, starting immediately after the study visit.
- Participants were asked to complete an accelerometer diary (logbook) each evening throughout the wear period. The diary gathered:
 - o Times at which the device was put on and taken off
 - o Any cycling activities, swimming sessions, or weight training performed during the day
- At the end of the 8-day wear period, participants returned the accelerometer device and the completed diary to the study center.

The accelerometer assessment period was defined as starting from the moment the participant received the device and ending after completion of the 8 consecutive days of wear.

2. Device Wear Instructions given to participants

- The accelerometer is a small, lightweight device worn on an elastic belt around the waist.
- The device measures acceleration and is used to assess habitual physical activity.
- Participants were instructed to continue their usual daily activities while wearing the device.
- The device is not waterproof and had to be removed during swimming and during showering, bathing, or sauna use.
- Participants were instructed to return the accelerometer package to the study center within one week after completion of the 8th wear day.

3. Data Collection and Initial Data Handling

Upon receipt of the accelerometer at the study center:

- Data were extracted from the device.
- The study nurse verified on the accelerometry software, ActiLife, that data had been successfully recorded and performed a basic visual inspection (e.g. signal presence, general plausibility of activity graphs).
- Information on the accelerometer retrieval and accelerometer diary content were entered into REDCap, the study data collection's platform.

4. Available Data Files

For each participant who completed this examination, the following files are available:

- **Examination metadata and accelerometer diary variables**
 - o File *1.3.9_Accelerometry.csv*
- **Accelerometers' output files**, produced by the device and accessible through the ActiLife software (extension .agd)
 - o Stored in folder named *1.3.9_Accelerometry_ActiLife*
 - o Data contained in the .agd files can only be opened and further processed using ActiLife software.

Of the 789 participants listed in the *1.3.9_Accelerometry.csv* file, not all have corresponding accelerometer data files (.agd) available; the csv document includes a set of variables prefixed with **acc_** that allow researchers to identify participants with usable accelerometer data, including indicators of participation in the measurement, whether the accelerometer was returned or lost, and whether data were successfully downloaded.

5. ActiLife Software information

Software: ActiLife (by ActiGraph)

Version at the time of data collection: ActiLife v6.13.3

Set epoch: 5s

No additional or advanced data cleaning or processing steps were undertaken beyond the generation of the .agd files.

Further data processing was intentionally not performed, as optimal accelerometer processing choices depend on the specific research question, including decisions on wear-time definitions, epoch length, cut-points, and outcome definitions.

ActiLife software is available from the ActiGraph website (recently rebranded [Ametris](https://ametriz.com)):

<https://ametriz.com/actilife>

Within ActiLife, participants are identified using their identification number **did**.

Both raw and processed accelerometer data files were retained for each participant.

Raw Accelerometer Files (.gt3x)

- The accelerometer devices generated raw data files in the proprietary .gt3x format.
- These files contain raw triaxial acceleration signals and device metadata.
- Raw files allow full reprocessing if needed, using ActiLife or external analysis pipelines.

ActiLife Processed Files (.agd)

- The .agd files were created using ActiLife software (version 6.13.3, ActiGraph) after importing the .gt3x files.
- The .agd files represent **processed accelerometry data** and are the main files made available to researchers.

6. Accelerometer-Derived outcomes available for analysis

The .agd files may allow the production and analysis of the following categories of variables (none exhaustive list):

Wear-Time and Non-Wear Detection

- Classification of wear vs. non-wear epochs
- Total daily wear time

Activity Counts

- Counts per epoch (fixed epoch length: 5 seconds)
- Counts per axis (X, Y, Z)

Steps

- Estimated step counts based on accelerometer signals

Energy Expenditure (Model-Based Estimates)

- Metabolic equivalents (METs)
- Energy expenditure (kcal)

These values are model-based estimates derived from accelerometry data and are not direct measurements of energy expenditure.

Sedentary Behaviour Outputs

- Total sedentary time
- Number of sedentary bouts
- Breaks in sedentary behaviour

Physical Activity Intensity Variables

Derived from activity counts using predefined cut-points:

- Sedentary time
- Light physical activity time
- Moderate physical activity time
- Vigorous physical activity time
- Moderate-to-vigorous physical activity (MVPA)
- Percentage of wear time spent in each intensity category

7. Important Notes on Data Processing and Use

No additional data cleaning, validation of wear-time criteria, or selection of activity cut-points was performed beyond the generation of the .agd files.

Researchers are expected to define and apply study-specific processing decisions based on their research questions, including:

- Wear-time and valid-day criteria
- Choice of algorithms to perform the calculations
- Choice of activity intensity cut points
- Selection of outcome variables

Accelerometer-based estimates (e.g. steps, METs, energy expenditure) should be interpreted as approximations derived from algorithms, not direct physiological measurements.