Ontology of estimated within bout walking speed

Access more resources: DATAcc's Core Measures of Physical Activity
Ontology of estimated within bout walking speed

**Definition**

Walking speed is the estimated "distance covered by the whole body within a certain time interval/per unit time of walking." The units of the estimated measure are meters per second.

**Concepts**

- **Walking bout**
- **Estimated speed**
- **Metadata**

**Properties**

- Average walking speed
- Start/end
- Minimum duration
- Criteria for walking bout
- Distance
- Measurement interval for speed
- Individual-specific variables
- Environmental variables
- Context-of-use dependent
- Measurement modality

**Values (or nested properties)**

- Average speed (meters/second), peak speed (meters/second), etc.
- Initiation timestamp/termination
- Seconds
- Minimum # of steps, strides, and/or cadence
- Meters
- Seconds
- Height, age, body mass index (BMI), gender/sex, age, use of walking aid, etc.
- Location, indoor or outdoor, transition of indoor to outdoor (or vice versa), weather, etc.
- Baseline health status, condition or therapeutic area (if relevant), typical comorbidities
- Technology type and model, evaluation algorithm, form factor, GPS, wear location (if wearable)

**Examples**

- Walking speed is often considered a 'sixth vital sign'.
- E.g., a minimum of 30 seconds has been used to define walking bouts.
- Examples of what is considered a bout, from the literature: Minimum two consecutive strides; Minimum six steps.
- Can be measured by GPS.
- Walking speed can be estimated by stride cadence, number of strides, and stride length, based on walking bouts (1, 2, 3).
Estimated within bout walking speed

Measure considerations (assumptions & limitations):

- While stepping and walking are related concepts, there is a distinction. Stepping is a component of walking, related to the movement of the foot and its contact with the ground. Walking describes more continuous locomotion, composed of a series of steps, often resulting in a forward displacement of a person’s center of mass. Walking is rhythmic and involves specific cadence, walking speed, stride length, and other kinematic properties. (1,2)

- If relying on GPS for distance measurement, this approach assumes accuracy in location measurement from consumer-based technologies (i.e., using GPS to measure actual meters traveled rather than an estimate of walking speed by estimation algorithms from inertial sensor data alone).

- Note that measures of cadence may also be informative and can be measured alongside estimated walking speed.