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Optimal Distance for Normal Gait Speed Testing

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Optimal Distance for Normal Gait Speed Testing

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California State University, Monterey Bay
Walking tests are simple, easy tests to examine: 5-9

- Functional independence
- Future health deterioration
- Screen for chronic lifestyle diseases such as hypertension
- Aid in clinical decision making such as:
  - Whether the patient will be homebound
  - Likelihood of hospitalization
  - Location of release after hospital visits
Walking Speed
[meter per second (m/s)]

0 mph
10 meter walk time 50 sec
10 foot walk time 15.2 sec

0.4 mph 0.9 mph 1.3 mph 1.8 mph 2.2 mph 2.7 mph 3.1 mph
25 sec 16.7 sec 12.5 sec 10 sec 8.3 sec 7.1 sec
5 sec 3.8 sec 3 sec 2.5 sec 2.2 sec

ADL: activities of daily living; IADL: instrumental ADLs; D/C: discharged; WS: walking speed; mph: miles per hour; sec: seconds
After a lit review, Middleton et al. (2015) recommended:

- 20m walk test; only measure middle 10m
- Start and end = accelerate and decelerate
- Potent walking speed test as long as there is room for acceleration and deceleration.

Alves and colleagues (2017):

- Distances others used:
  - 2.44-4.6m (8 studies)
  - 6-6.15m (5 studies)
  - 20m (1 study)
Different protocols generate a gap in knowledge of and a questioning in the test’s accuracy.
Our previous research

- Tested a smartphone:
  - 6th Vital Sign App
    - Reliable
    - Not Valid
- Brower Timing Gates
  - Reliable
  - Valid

Current research question:

What is the most effective distance for a gait speed test?
To determine the optimal distance segment for calculating gait speed, which can be used to standardize walking tests in clinical settings.
Methods

- Sets of Brower Timing Gates (Brower Timing Systems, Draper, USA) were placed at the starting line and at the 5, 10, and 20m marks.

- Subjects:
  1. Started with their toes on the -30 cm line.\(^9\)
  2. Began the test at their volition.
  3. Walked at their normal pace.

- Compared 0-5m, 5-10m, and 10-20m using a linear mixed-effect model.

- Statistics done using R version 3.5.0 with lme4 and lmerTest packages.
36 students completed the assessment (24 female, 11 male, 1 declined to answer; mean age = 21.5 ± 2.6 years, height = 168.8 ± 10.4 cm, mass = 77.2 ± 19.3 kg).

Average gait speed for each test segment:

<table>
<thead>
<tr>
<th></th>
<th>0-5m</th>
<th>5-10m</th>
<th>10-20m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gait Speed</td>
<td>1.361 m/s</td>
<td>1.449 m/s</td>
<td>1.467 m/s</td>
</tr>
</tbody>
</table>

P-values for comparisons of gait speeds between the different segments:

<table>
<thead>
<tr>
<th></th>
<th>5-10m</th>
<th>10-20m</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5m</td>
<td>P &lt; 0.0001</td>
<td>P &lt; 0.0001</td>
</tr>
<tr>
<td>5-10m</td>
<td>--</td>
<td>0.18</td>
</tr>
</tbody>
</table>
Discussion

● Meaning of Results:
  a. Acceleration (0-5m)
  b. Already stabilized at 5-10m

● Application for gait speed testing:
  c. 10-20m not necessary
  d. Need room for acceleration and deceleration.

● Comparing to Literature:
  e. Short tests (especially 4m) while common\(^5\), have no real world meaning. \(^{14,15}\)
Testing patients in clinical settings using walk speed tests under 5 meters is not advised because a patient will still be accelerating to their actual walking speed.

The most efficient distance for measuring gait speed would be between 5-10 meters during a 15m walk test.
Future Work

Continue to refine methods.

We will record from 5-10m but have them walk 15m

Comparing normal vs fast speed as predictor.

Observe difference in health disparities between Latino Americans and European Americans in college age students.


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Questions?