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Pedometer-determined physical activity in Danish adults considering non-ambulatory activities

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Background. Objective measurements of physical activity for surveillance are needed in Denmark.

Objective. To assess current levels of pedometer-determined physical activity (steps/day) in the Danish adult population using raw steps and steps considering non-ambulatory activities (NAA).

Methods. The study was performed in a nationally representative sample of 229 Danish adults (52% men) 15-75 years of age recruited for the 2007-2008 Danish National Survey of Dietary Habits and Physical Activity. Data of mean steps/day were collected during seven consecutive days using sealed pedometers (Yamax SW-200, Tokyo, Japan). All participants had at least four valid recording days. In addition, NAA such as cycling, swimming etc. were recorded daily in a questionnaire. Time spent on NAA was converted to step equivalents by adding 200 step equivalents/min (6 METs) using the Intermediate Conversion Method suggested by Miller et al (2006). A pilot study showed a mean recording of 40 steps/min during moderate pace cycling (18.4 km/h). To account for this “double counting” during cycling, only 160 step equivalents/min were added per min of cycling. Addition of >10,000 step equivalents/day was truncated to 10,000 to avoid overestimation.

Table 1. Raw steps, steps considering NAA and difference between raw steps and steps considering NAA among Danish adults (mean (SD))

<table>
<thead>
<tr>
<th></th>
<th>Raw steps/day</th>
<th>Steps/day with NAA</th>
<th>Difference (raw vs. steps with NAA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All (n=229)</td>
<td>8,912 (2,320)</td>
<td>10,406 (4,060)</td>
<td>1,494* (2,094)</td>
</tr>
<tr>
<td>Men (n=120)</td>
<td>8,718 (2,434)</td>
<td>9,856 (4,120)</td>
<td>1,138* (1,865)</td>
</tr>
<tr>
<td>Women (n=109)</td>
<td>9,125 (2,991)</td>
<td>11,011 (3,922)</td>
<td>1,886* (2,264)</td>
</tr>
</tbody>
</table>

* P<0.001 using Student’s t-test

Results. There was a significant difference of 1,494 steps/day (17%) between raw steps and steps considering NAA among Danish adults (Table 1). 36% of all adults took at least 10,000 steps/day and 54% when considering NAA (Figure 1). No significant difference in raw steps was found between genders. However, when considering NAA, women were more active than men (p=0.03). Step equivalents were added for 53% of all participants. The most frequently reported NAA was commuting by cycle, which was reported by 39% (mean 125 min/week). Truncation was carried out for 73 out of 364 conversion days (20%).

Figure 1. Danish adults categorized according to step-defined activity levels using both raw steps and steps considering NAA

Conclusion. A large part of the Danish adult population is not sufficiently active if the reasonable target is 10,000 steps/day. Commuting by cycle is a main everyday activity in countries like Denmark and to avoid underestimation of the physical activity level, NAA should be considered when assessing pedometer-determined physical activity in the general population.