Sitting time and changes in sitting time in children and adolescents: impact of accelerometer data reduction decisions

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Acknowledgments
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In the news

Women who spend too long sitting may die earlier

"Why sitting for too long can be deadly for older women... even if they go to the gym," reports the Mail Online.

Sitting could be the new smoking as research suggests people need to move about more to cut risks to health
Sitting and health outcomes

- Large amount of the day is spent sedentary (i.e. sitting)
- Sedentary behaviour is related to health independent of moderate-to-vigorous intensity physical activity.
- Prolonged bouts versus interrupted patterns of sitting

Changes in sedentary behaviour

- Gnyterland et al. (2011), 11.2 years
- Basterfield et al. (2012), 7.4 years
- Mitchell et al. (2013), 12 years
- Ortega et al. (2015), 9.6 years, Estonian
- Mitchell et al. (2016), 9 years
- Ortega et al. (2017), 9.6 years, Swedish
- Kwon et al. (2018), 5.7 years

Data from Tanaka et al. Obesity Reviews. In press.
Methodological decisions

- Number of valid days
- Accelerometry cut-points
- Minimum wear time
- Non-wear time definition

10 minutes of consecutive zeros (-20 min)
60 minutes of consecutive zeros (+ 36 min)
Research question

What is the impact of different accelerometer non-wear time rules on sitting time and changes in sitting time in children and adolescents?

Methods

• Gateshead Millennium Study
• ActiGraph accelerometer data collected at age 9 and age 12
• Sitting time was defined using < 25 counts/15s cut point
• Non-wear time was defined using manual data reduction and 10, 20 and 60 min consecutive zeros
Methods

Outcomes

• Sitting time per day (min and %)
• Sitting time per 12h day
• Changes in sitting time per day

<table>
<thead>
<tr>
<th>Sitting time (min)</th>
<th>9Y (N = 17)</th>
<th>12Y (N = 440)</th>
<th>Change (N = 390)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>Manual</td>
<td>373.1</td>
<td>63.8</td>
<td>461.6</td>
</tr>
<tr>
<td>&gt; 10 min</td>
<td>363.6</td>
<td>56.9</td>
<td>423.7</td>
</tr>
<tr>
<td>&gt; 20 min</td>
<td>385.4</td>
<td>62.9</td>
<td>464.3*</td>
</tr>
<tr>
<td>&gt; 60 min</td>
<td>425.7</td>
<td>67.3</td>
<td>518.2</td>
</tr>
</tbody>
</table>

* not significant compared to manual rule
### Sitting time from age 9-12 years after correction for 12h day

<table>
<thead>
<tr>
<th>Corrected sitting time (min)</th>
<th>9Y (N = 517)</th>
<th>12Y (N = 440)</th>
<th>Change (N = 390)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>Manual</td>
<td>398.3</td>
<td>50.5</td>
<td>468.8</td>
</tr>
<tr>
<td>&gt; 10 min</td>
<td>388.5</td>
<td>46.7</td>
<td>450.3</td>
</tr>
<tr>
<td>&gt; 20 min</td>
<td>398.4*</td>
<td>48.9</td>
<td>464.6</td>
</tr>
<tr>
<td>&gt; 60 min</td>
<td>415.8</td>
<td>48.1</td>
<td>482.0</td>
</tr>
</tbody>
</table>

*not significant compared to manual rule

### Sitting time from age 9-12 years after wear time correction

<table>
<thead>
<tr>
<th>Sitting time (% of wear time)</th>
<th>9Y (N = 517)</th>
<th>12Y (N = 440)</th>
<th>Change (N = 390)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
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</tr>
<tr>
<td>Manual</td>
<td>55.3</td>
<td>7.0</td>
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</tr>
<tr>
<td>&gt; 10 min</td>
<td>54.0</td>
<td>6.5</td>
<td>62.5</td>
</tr>
<tr>
<td>&gt; 20 min</td>
<td>55.3*</td>
<td>6.8</td>
<td>64.5</td>
</tr>
<tr>
<td>&gt; 60 min</td>
<td>57.8</td>
<td>6.7</td>
<td>67.0</td>
</tr>
</tbody>
</table>

*not significant compared to manual rule;
Discussion

- 20 minutes closest estimate at both ages.
- Increase in differences between methods at an older age.

![Bouts of sitting chart]

Conclusion

- Significant differences in sitting time and changes in sitting time between rules
- Correcting for wear time may improve comparability between studies
- 20 min zero-string rule may improve comparability between studies
Thank you!