Capturing Contextual Information About Sports and Exercise Using Ecological Momentary Assessment

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Abstract

Accelerometers provide an objective assessment of physical activity but cannot easily distinguish activity types. Ecological momentary assessment (EMA) can prompt participants during changes in physical activity or random time intervals, potentially providing more information than accelerometry alone. High school students were instructed to wear an accelerometer, carry a smartphone with an EMA application, and answer prompts about their activities for 14 days. After adjusting for age and gender, prompts reporting sports or exercise had significantly more MVPA in 60 minutes preceding that prompt than prompts reporting all other types of activities. There were no differences in prior MVPA among any of the types or forms of sports or exercise reported except endurance exercise. The findings provide evidence for the construct validity in EMA-reported sports or exercise compared to objectively measured MVPA.

Methods

Procedure:
For 14 days, participants were instructed to:
- wear an Actigraph accelerometer
- carry an Android smartphone (Nexus 4) with a custom EMA application

Signal-Contingent Prompting Schedule:

<table>
<thead>
<tr>
<th>Type of Trigger</th>
<th>Targeted Behaviors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Activity</td>
<td>Any activity intensity, 10+ min. of moderate intensity activity or greater</td>
</tr>
<tr>
<td>Other</td>
<td>Momentary assessment activity followed by 10+ min. of non-activity data</td>
</tr>
</tbody>
</table>

Event-Contingent Prompting Schedule:

<table>
<thead>
<tr>
<th>Type of Trigger</th>
<th>Targeted Behaviors</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Process or Software Crash</td>
<td>Any activity intensity</td>
</tr>
</tbody>
</table>

Measures:

MVPA (60 min) as a function of sports/exercise form among any of the types or forms of sports or exercise reported for 60 minutes preceding that prompt.

Results

171 prompts (4.1%) reported any sports/exercise activity.

Table 1. Results of multi-level linear regression predicting MVPA as a function of sports/exercise vs. non-sports/exercise

<table>
<thead>
<tr>
<th>Type of Activity</th>
<th>Beta</th>
<th>S.E.</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Activity</td>
<td>4.28***</td>
<td>0.87</td>
<td>0.001</td>
</tr>
<tr>
<td>Other</td>
<td>2.39</td>
<td>1.26</td>
<td>0.05</td>
</tr>
<tr>
<td>None</td>
<td>0.99</td>
<td>0.71</td>
<td>0.33</td>
</tr>
</tbody>
</table>

Figure 1. Frequency of reported sports/exercise types

Summary and Conclusion

- The findings provide evidence for the construct validity in EMA-reported sports or exercise compared to objectively measured MVPA.
- The lack of differences in MVPA among specific types and forms of sports and exercise highlights a unique advantage of EMA to capture contextual information about physical activity beyond the capabilities of an accelerometer.
- The differences in MVPA for endurance exercises vs. all other forms suggests that accelerometry can best differentiate endurance vs. non-endurance exercise.
- The study is limited by a small sample response to sports/exercise as an activity type and relies on null findings for the conclusion. Nevertheless, there were no observable trends toward significance.

References


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