Validity of Wearable Activity Monitors for Estimation of Resting Energy Expenditure in Adults

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Validity of Wearable Activity Monitors for Estimation of Resting Energy Expenditure in Adults

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ABSTRACT

The purpose of this study was to evaluate the validity of Resting Energy Expenditure estimates from Fitbit Flex and SenseWear Mini in adults.

METHODS

Table 1: Participant demographics

<table>
<thead>
<tr>
<th></th>
<th>Females (N=30)</th>
<th>Males (N=30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>Mean ± SD</td>
<td>Range</td>
</tr>
<tr>
<td></td>
<td>24.2 ± 4.1</td>
<td>18.0 - 38.0</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>166.0 ± 7.0</td>
<td>154.2 - 187.0</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>60.3 ± 8.5</td>
<td>47.6 - 85.2</td>
</tr>
<tr>
<td>Body Fat (%)</td>
<td>20.4 ± 5.8</td>
<td>8.3 - 35.6</td>
</tr>
<tr>
<td>Body Mass Index (kg/m²)</td>
<td>21.3 ± 2.1</td>
<td>18.1 - 31.2</td>
</tr>
</tbody>
</table>

Procedures

- Participants signed an informed consent
- Participants fasted for 10 hours before coming into lab the next morning
- Resting energy expenditure was measured using open-circuit indirect calorimetry following previously published guidelines [4]
- Estimates of REE from the Fitbit Flex and the SenseWear Mini were obtained from the corresponding software and website

RESULTS

Table 2: REE (kcal/day) from each method of measure measurement

<table>
<thead>
<tr>
<th></th>
<th>Mean ± SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured Resting (IC)</td>
<td>1554.2 ± 249.3</td>
<td>1189.0 - 2500.2</td>
</tr>
<tr>
<td>SenseWear Mini</td>
<td>1587.1 ± 247.7</td>
<td>1239.8 - 2101.3</td>
</tr>
<tr>
<td>Fitbit Flex</td>
<td>1528.0 ± 213.0</td>
<td>1152.0 - 1920.0</td>
</tr>
<tr>
<td>Institute of Medicine</td>
<td>1559.1 ± 217.7</td>
<td>1218.5 - 1986.8</td>
</tr>
<tr>
<td>World Health Organization</td>
<td>1598.3 ± 246.0</td>
<td>1180.1 - 2099.8</td>
</tr>
</tbody>
</table>

- ANOVA and post-hoc analyses showed no significant effects of gender for any of the comparisons with REE from IC

CONCLUSIONS

- The estimates of REE from the Fitbit Flex, SenseWear Mini, Institute of Medicine, and World Health Organization are consistent with IC REE measurement
- The derived REE value from the two wearable devices as well as the equations from the Institute of Health and World Health Organization provide reasonable estimates of REE

REFERENCES


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