Physically Interactive Games Increase VO₂ Above Resting Metabolic Rate

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ABSTRACT

PURPOSE: The purpose of this study was to determine the energy cost, beyond resting metabolic rate (RMR), of playing select games on the Nintendo Wii for 30 contiguous minutes. METHODS: Twenty-four apparently healthy adults (n = 12 females; n = 12 males) aged 23.7 ± 7.3 y, with a height, mass, and percent body fat of 167.0 ± 9.8 cm, 66.7 ± 13.0 kg, and 18.2 ± 8.4 %, respectively, were voluntarily recruited. Oxygen consumption (VO₂) was measured in a supine position for 15 minutes to determine RMR, followed by a 30 minute gaming session. One of three randomly selected games (Basic Run, Basic Step, or Tanks!) were played over 3 laboratory visits while VO₂ was measured continuously throughout each gaming session; data were reduced to a 30-min average. A repeated measures factorial ANOVA was used to determine differences between VO₂ and RMR among games (α = 0.05). RESULTS: The mean difference in VO₂ from RMR was significantly higher when playing Basic Run (µ ± SD = 9.2 ± 2.1 ml·kg⁻¹·min⁻¹; p = 0.004) or Basic Step (6.7 ± 0.6 ml·kg⁻¹·min⁻¹; p < 0.001), but not different when playing Tanks! (0.44 ± 0.43 ml·kg⁻¹·min⁻¹; p = 0.338). Mean VO₂ differences for Basic Run (8.7 ± 2.4 ml·kg⁻¹·min⁻¹; p = 0.010) and Basic Step (6.3 ± 0.91 ml·kg⁻¹·min⁻¹; p < 0.001) were higher compared with Tanks!. No mean differences were observed between Basic Run and Basic Step (2.5 ± 2.0 ml·kg⁻¹·min⁻¹; p = 0.271). CONCLUSION: Physically interactive games (i.e. Basic Run and Basic Step) increase energy expenditure above resting values compared to a sedentary game (Tanks!) and therefore may help individual’s become more active. Furthermore, Basic Run and Basic Step elicited MET values of 3.9 and 3.2, respectively, which is considered moderate-intensity exercise and could be used to meet daily recommendations for physical activity.

METHODS

Subjects: • Apparently healthy adults from the UNLV community (Table 1)

Instrumentation: • Nintendo Wii Gaming Console (Nintendo of America, Inc., Redmond, WA, USA) • Wii Balance Board (Nintendo of America, Inc., Redmond, WA, USA) • MOXUS Metabolic Cart; Applied Electrochemistry, Pittsburg, PA, USA)

Procedures: • 3 Gaming conditions, 30 min each, randomized: • Tanks! (T) • Basic Step (BS) • Basic Run (BR)

Data Reduction • RMR was averaged over 15 min • VO₂ was averaged over 30 min for each gaming session.

Statistical Analysis • Dependent Variable: VO₂ (ml·kg⁻¹·min⁻¹) • Independent Variables: Wii Video Games (i.e. BR, BS, and T) • Repeated Measures Factorial ANOVAs were used to assess differences in VO₂.

RESULTS

Table 1: Subject Characteristics (avg. ± SD)

<table>
<thead>
<tr>
<th>n</th>
<th>Age (y)</th>
<th>Height (cm)</th>
<th>Mass (kg)</th>
<th>% fat</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>23.7 ± 7.3</td>
<td>167.0 ± 9.8</td>
<td>66.7 ± 13.0</td>
<td>18.2 ± 8.4</td>
</tr>
</tbody>
</table>

CONCLUSION: Physically interactive games (i.e. Basic Run and Basic Step) increase energy expenditure above resting values compared to a sedentary game (Tanks!) and therefore may help individual’s become more active. Furthermore, Basic Run and Basic Step elicited MET values of 3.9 and 3.2, respectively, which is considered moderate-intensity exercise and could be used to meet daily recommendations for physical activity.