Interactive Video Gaming Maintains VO₂ & HR at Current Recommended Exercise Intensities for Cardiovascular Fitness

Michael Jarrett¹, ShaeLee Allen¹, Jacob E. Barkley, Ph.D.², Janet S. Dufek, Ph.D., FACSM¹, Paul Hafen¹, Krystina Moschella ¹, James Navalta, Ph.D.¹, Robert Rietjens¹, Richard Tandy, Ph.D.¹, and Antonio S. Santo, Ph.D., R.D., C.S.S.D.¹

¹Department of Kinesiology and Nutrition Sciences, University of Nevada, Las Vegas
²Exercise Science, Kent State University

ABSTRACT

Purpose: The purpose of this study was to determine the energy cost of playing select games on the Nintendo Wii for 30 contiguous minutes and whether or not the physical interaction of the participant with the gaming system and subsequent physiologic intensity diminishes with playing time. Methods: Seven apparently healthy adults (n = 3 females) aged 29.0 ± 9.1 y, with a height, mass, and percent body fat of 169.1 ± 8.1 cm, 73.1 ± 13.8 kg, and 21.0 ± 7.0 %, respectively, were voluntarily recruited. Resting metabolic rate was obtained at baseline followed by continuous oxygen consumption (VO₂) and heart rate (HR) measurements during 30 minutes of game play of 3 Wii games (Tanks!, Basic Run, and Basic Step) completed in a random order across each of three days. Continuous VO₂ and HR data were reduced by calculating averages in 5-minute intervals for each gaming session. Two 2 factor (time x game) repeated measures factorial ANOVAs were used to determine differences in VO₂ and HR among six, 5-minute intervals and three games (α = 0.05). Results: There were no significant time x game interactions or time main effects observed for VO₂ or HR. Significant game effects were observed with VO₂ significantly lower while participants played Tanks! (11.4 ± 1.7 ml·kg⁻¹·min⁻¹, 3.3 ± 0.5 METs), compared with Basic Step (16.14 ± 5.8 ml·kg⁻¹·min⁻¹, 4.6 ± 1.7 METs, p < 0.001) and Basic Run (16.14 ± 5.8 ml·kg⁻¹·min⁻¹, 4.6 ± 1.7 METs, p < 0.001), HR was significantly higher while playing Basic Run (115.9 ± 24.6 beats·min⁻¹, 59 ± 2% HRmax, p = 0.001) and Basic Step (96.4 ± 13.3 beats·min⁻¹, 49.1 ± 0.3% HRmax, p < 0.001) compared with Tanks! (75.9 ± 11.9 beats·min⁻¹, 38.7 ± 0.3% HRmax). Conclusion: It does not appear that participants alter their physical interaction with the gaming system and therefore do not diminish physiologic intensity (i.e. VO₂ and HR) over consistent, repeated game play. Furthermore, participants maintained MET and HR values for Basic Step and Basic Run throughout the 30-min period in ranges that are considered moderate-intensity exercise for cardiorespiratory fitness. These data suggest that individuals may choose to play Basic Step or Basic Run and still meet the current recommended guidelines for moderate-intensity 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 • VO₂ and HR data were averaged in 5 minute intervals for each gaming session.

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

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>
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</tbody>
</table>

Figure 1: VO₂ over 30 min of game play.

Figure 2: HR over 30 min of game play.

CONCLUSION

It does not appear that participants alter their physical interaction with the gaming system and therefore do not diminish physiologic intensity (i.e. VO₂ and HR) over consistent, repeated game play. Furthermore, participants maintained MET and HR values for Basic Step and Basic Run throughout the 30-min period in ranges that are considered moderate-intensity exercise for cardiorespiratory fitness. These data suggest that individuals may choose to play Basic Step or Basic Run and still meet the current recommended guidelines for moderate-intensity physical activity.