Exergaming for individuals with neurological disability: a systematic review

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Abstract

Introduction: Exergames have the potential to enable persons with disabilities to take part in physical activities that are of appropriate “dose-potency” and enjoyable within a relatively safe home environment. It overcomes some of the challenges regarding transportation difficulties in getting to commercial gymnasium facilities, reducing physical activities perceived as “boring” or getting access into the built environment that may be “wheelchair unfriendly”. Objective: This systematic review assessed available evidence whether “exergaming” could be a feasible modality for contributing to a recommended exercise prescription according to current ACSM™ or WHO guidelines for physical activity. Methods: Strategies used to search for published articles were conducted using separate search engines (Google Scholar™, PubMed™ and Web of Science™) on cardiometabolic responses and perceived exertion during exergaming among neurologically-disabled populations possessing similar physical disabilities. Each study was categorized using the SCIRE-Pedro evidence scale. Results: Ten of the 144 articles assessed were identified and met specific inclusion criteria. Key outcome measures included responses, such as energy expenditure, heart rate and perceived exertion. Twelve out of the 17 types of exergaming interventions met the ACSM™ or WHO recommendations of “moderate intensity” physical activity. Exergames such as Wii Jogging, Bicycling, Boxing, DDR and GameCycle reported moderate physical activity intensities. While
Wii Snowboarding, Skiing and Bowling only produced light intensities. **Conclusion:** Preliminary cross-sectional evidence in this review suggested that exergames have the potential to provide moderate intensity physical activity as recommended by ACSM™ or WHO in populations with neurological disabilities. However, more research is needed to document exergaming’s efficacy from longitudinal observations before definitive conclusions can be drawn.

- **Implications for Rehabilitation**
  
  - Exergaming can be deployed as physical activity or exercise using commercially available game consoles for neurologically disabled individuals in the convenience of their home environment and at a relatively inexpensive cost
  
  - Moderate-to-vigorous intensity exercises can be achieved during exergaming in this population of persons with neurological disabilities. Exergaming can also be engaging and enjoyable, yet achieve the recommended physical activity guidelines proposed by ACSM™ or WHO for health and fitness benefits.
  
  - Exergaming as physical activity in this population is feasible for individuals with profound disabilities, since it can be used even in sitting position for wheelchair-dependent users, thus providing variability in terms of exercise options.
  
  - In the context of comprehensive rehabilitation, exergaming should be viewed by the clinician as “at least as good as” (and likely more enjoyable) than traditional arm-exercise modalities, with equivalent aerobic dose-potency as “traditional” exercise in clinic or home environments.

**Keywords:** Energy expenditure, exercise, exergame, exertion, heart rate, muscular, neurological disability
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