VIDEO GAMES: A NEW OPPORTUNITY IN EXERCISE TRAINING

Chiara Tartali
Clizia Cazzaroli
Centro Fibrosi Cistica Verona

INTRODUCTION

Exercise is recognised as an important component of overall treatment for people with respiratory disease.

BENEFITS OF EXERCISE

- Enhanced mucus clearance
- Increased respiratory muscle endurance, decreased breathlessness
- Increased cardiorespiratory fitness
- Increased muscle mass and strength
- Improved body image
- Promote emotional well being and perceived health
Subjects with respiratory disorders typically have low long-term adherence to their complex treatment regimen, including chest physiotherapy and exercise.

Factors influencing adherence to exercise

- Time available
- Disease acceptance
- Motivation
- Explicit goals
- Enjoyment


Factors influencing adherence to exercise

- Self management
- Perceived competence
- Social support
- Active involvement of patient
- Supportive feedback
- Gender


It is imperative to maximise adherence with exercise
INTRODUCTION

**Strategies to improve adherence:**

- Regular supervision
- Individualised (interests and limitations) exercise program
- Enjoyable exercise program


INTRODUCTION

The reasons for adherence to exercise programs are complex. **Enjoyment and perceived competence** in an activity or exercise have been suggested to be among the most important.


ACTIVE VIDEOGAME (AVG)

- Exercise programs based on using an active videogame offer the potential to meet some of the challenges associated with exercise adherence.

- An AVG, or active videogame, is defined as electronic media that allows players to actively interface with the game by physical manipulation of equipment.
ACTIVE VIDEOGAME (AVG)

-Wii™ (Nintendo Co. Ltd., Tokyo, Japan) is operated through hand-held wireless controllers.

-When a player simulates certain movements with the controller, their onscreen virtual character moves in the same way. This allows the player to move freely while controlling their virtual onscreen character.

ACTIVE VIDEOGAME (AVG)

-Entertainment and distraction: the subject focuses on game play rather than his or her impairment: more enjoyable exercise and improved adherence to and completion of training program.

Active (perhaps physical) involvement
Voluntary
Intrinsically motivating
Help reconnect patients with their social environments

Relatively inexpensive
Can be located at home
With specifically designed gaming programs, by Internet, therapist can see if the patient is performing exercises correctly

The American College of Sports Medicine (ACSM) recommends engaging in moderate-intensity aerobic physical activity for a minimum of 30 minutes for 5 days each week or vigorous-intensity aerobic physical activity for 20 minutes on 3 days each week to promote and maintain health.
As early as the 1980s researchers were starting to explore the potential application of computer (video) games in healthy.

Playing active video games have been shown to elicit greater energy expenditure compared to rest and traditional non-active video games, as well as other common sedentary activities such as TV watching.

Several studies on the energy cost of playing AVG in healthy subjects have concluded that they constitute light- to moderate-intensity activity.

AVG games is similar in intensity to traditional physical activities such as walking, jogging, and cycling, approximately 3–6 Metabolic Equivalents (METS).
Playing AVGs significantly increased HR, VO2, and EE from resting. The effect sizes of playing AVGs on HR, VO2, and EE were similar to traditional physical activities. AVG type and player age were significant moderators for the effects of AVGs. The finding suggests that AVGs are effective technologies that may facilitate light- to moderate-intensity physical activity promotion.

All studies were of short duration (12 weeks maximum) and thus were unable to provide insight into the sustainability of this intervention and the possible impact on other important variables such as body mass and physical fitness.

Daily Wii FitTM use declined by 82% (p < 0.01) from 21.5 ± 9.0 min/d during the first 6 weeks to 3.9 ± 4.0 min/d during the second 6 weeks. Most measures of health-related fitness remained unchanged after 3 months of home use of Wii FitTM. Modest daily Wii FitTM use may have provided insufficient stimulus for fitness changes.
**Comparision Between Nintendo Wii Fit Aerobics and Traditional Aerobic Exercise in Sedentary Young Adults**

- HRmax achieved with Wii Fit (142.4 ± 20.5 b/min) was significantly greater (p = 0.001) compared with exercising on the treadmill (123.2 ± 13.7 b/min).
- Rating of perceived exertion playing Wii Fit (12.7 ± 3.0) was significantly greater (p = 0.001) compared with treadmill (10.1 ± 3.3).
- Participants’ positive well-being decreased significantly (p = 0.018) from preexercise to postexercise when compared with exercising on the treadmill.

Douris, PC, McDonald, B, Vespi, F, Kelley, NC, and Herman, L. J Strength Cond 2012; 26(4): 1052-1057

---

**AVG as EXERCISE TRAINING**

**Comparision Between Nintendo Wii Fit Aerobics and Traditional Aerobic Exercise in Sedentary Young Adults**

<table>
<thead>
<tr>
<th>Authors</th>
<th>Methods</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bosch et al, 2012</td>
<td>HRmax during Nintendo-Wii® (base)</td>
<td>Nintendo-Wii® 77.5% HRmax—moderate to vigorous aerobic response</td>
</tr>
<tr>
<td>Douris et al, 2012</td>
<td>Treadmill vs Nintendo-Wii®</td>
<td>HRmax achieved with Wii Fit (142.4 ± 20.5 b/min) was significantly greater (p = 0.001) compared with exercising on the treadmill (123.2 ± 13.7 b/min)</td>
</tr>
<tr>
<td>D’Simonsson et al, 2012</td>
<td>Energy expenditure during 10 minutes of Xbox Kinect® and during 10 minutes of Nintendo-Wii®</td>
<td>The energy expenditure during all gaming conditions was of a light intensity</td>
</tr>
<tr>
<td>Klein et al, 2011</td>
<td>20-minute self-selected intensity Main video game interactive bicycle ergometer, interactive video dance game and traditional cycle ergometer while watching television</td>
<td>WiiFit were significantly higher for interactive bicycle ergometer. The RPE was significantly higher for interactive bicycle ergometer and traditional cycle ergometer than interactive video dance game. Results support that exergames are capable of eliciting physiological responses necessary for health.</td>
</tr>
</tbody>
</table>
The long-term physiological responses and compliance to video exergaming should be investigated, because it is usually performed alone eliminating the social aspect of exercise.

**Active Video Game (AVG) as Exercise Training in Patients with Respiratory Disorders**

- Lower extremity exercise training at higher exercise intensity produces greater physiologic benefits than lower intensity training in patients with COPD.
- Both low-intensity and high-intensity exercise training produce clinical benefits for patients with COPD.
- Longer pulmonary rehabilitation programs (12 weeks) produce greater sustained benefits than shorter programs.

Physiologic Variables Observed in COPD Patients While Exercising With An Interactive Activity-Promoting Video Game

Five patients with stable COPD 3-5 minutes Wii exercises

- Chest 2007; 131:4S–42S
- ATS 2011 International Conference
Physiologic Variables Observed in COPD Patients While Exercising With An Interactive Activity-Promoting Video Game

- These preliminary data indicate that COPD patients exercised at a relatively high percent of their maximum during 3-5 minutes of the specified Wii exercises. This may be a reasonable home-based exercise regimen for COPD patients. Further studies are necessary to determine safety, adherence, and effectiveness.

The Use of a Home Exercise Program Based on a Computer System in Patients With Chronic Obstructive Pulmonary Disease.

- 25 clinically stable COPD patients (FEV1 % pred. 45)
- 6-week nonintervention (baseline) period followed by 12 weeks of Wii exercise training at home, 5 or more days per week
- Exercise capacity, health status, and dyspnea were evaluated after home exercise training.

Efficacy of Physical Exercise Playing a Video Game for Mucus Clearance in Patients with Cystic Fibrosis

ABSTRACT

AVG more efficacy than conventional physiotherapy

Aquino et al. J Cyst Fibros. 2006;5(S1):S83

Use of Nintendo Wii for Exercise in Adult CF Patients

ABSTRACT

- Dyspnoea and fatigue increased significantly
- No significant increase in HR e SpO2
- Mean patient enjoyment was 9/10

Boyle et al. J Cyst Fibros. 2009;8(S2):S71

Kinect Active Video Game in Cystic Fibrosis: Exercise or fun?

ABSTRACT

Elena Salonini, Simone Gambazza, Milva Sanguanini

AIMS
Evaluate if using Xbox KinectTM produce a similar cardiovascular demand as exercise on traditional stationary cycle training and patient’s perception of dyspnea, fatigue and enjoyment.
Kinect Active Video Game in Cystic Fibrosis: exercise or fun?

**CONCLUSIONS**

- Few studies
- Short term studies
- No specific games
CONCLUSIONS

**POTENTIAL ADVANTAGES**

- Improve adherence
- More enjoyable
- Home exercise

**CONCLUSIONS**

Future researches are needed to investigate in patients with respiratory disorders:

The AVG long term training effects in term of physiologic response and adherence