

# Energy expenditure in adolescents playing new generation computer games

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## ABSTRACT

**Objective** To compare the energy expenditure of adolescents when playing sedentary and new generation active computer games.

**Design** Cross sectional comparison of four computer games.

**Setting** Research laboratories.

**Participants** Six boys and five girls aged 13-15 years.

**Procedure** Participants were fitted with a monitoring device validated to predict energy expenditure. They played four computer games for 15 minutes each. One of the games was sedentary (XBOX 360) and the other three were active (Wii Sports).

**Main outcome measure** Predicted energy expenditure, compared using repeated measures analysis of variance.

**Results** Mean (standard deviation) predicted energy expenditure when playing Wii Sports bowling (190.6 (22.2) kJ/kg/min), tennis (202.5 (31.5) kJ/kg/min), and boxing (198.1 (33.9) kJ/kg/min) was significantly greater than when playing sedentary games (125.5 (13.7) kJ/kg/min) ( $P < 0.001$ ). Predicted energy expenditure was at least 65.1 (95% confidence interval 47.3 to 82.9) kJ/kg/min greater when playing active rather than sedentary games.

**Conclusions** Playing new generation active computer games uses significantly more energy than playing sedentary computer games but not as much energy as playing the sport itself. The energy used when playing active Wii Sports games was not of high enough intensity to contribute towards the recommended daily amount of exercise in children.

## INTRODUCTION

Young people are currently recommended to take an hour of moderate to vigorous physical exercise each day, which should use at least three times as much energy as is used at rest.<sup>1 2</sup> Many adolescents have mostly sedentary lifestyles,<sup>3</sup> however, as a result of a variety of factors. Time spent in front of television and computer screens has been causally linked to physical inactivity and obesity, although the associations are often weak.<sup>4</sup>

The new generation of wireless based computer games is meant to stimulate greater interaction and movement during play. A recent study reported that playing computer games using a hand held controller while seated increased energy expenditure above resting values by 22%, whereas activity based games that require upper body movements and dance games increased energy expenditure by 108% and 172%, respectively.<sup>5</sup> The new generation of computer games could therefore be a useful addition to the range of opportunities for physical activity available to adolescents. Children spend a large amount of time playing computer games,<sup>6</sup> and it is difficult to persuade them

to relinquish these screen based activities.<sup>7</sup> Activity promoting computer games might therefore be a useful way to increase activity in young people. In this study, we measured the energy expenditure of adolescent girls and boys playing Nintendo Wii (active) and Microsoft XBOX 360 (inactive) computer games.

## METHOD

### Participants and settings

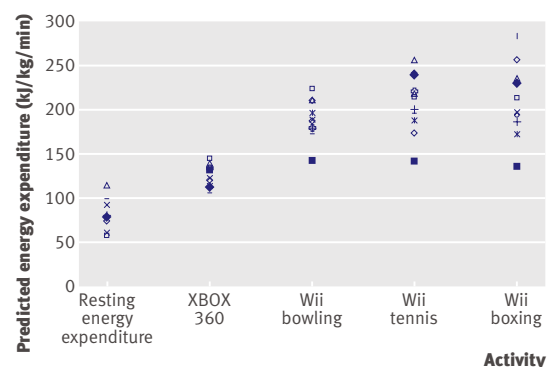
A convenience sample of five girls and six boys aged 13-15 participated in the study. All participants regularly played sedentary computer games for at least two sessions of two hours each week and had not previously used Wii. All girls and boys were competent at sport; they regularly represented their school at hockey or netball (girls) and rugby or soccer (boys). Parents and adolescents consented to the study.

### Anthropometry

We measured height to the nearest 0.1 cm using a portable stadiometer and weight to the nearest 0.1 kg using a calibrated mechanical flat scale. Measures were taken using standard anthropometric techniques.<sup>8</sup>

### Familiarisation

On separate days from experimental trials, participants practised playing on the XBOX 360 and Wii computer consoles. For sedentary gaming, participants completed two races on a single player race mode on the game Project Gotham Racing 3 (XBOX 360) using a wireless hand held controller. For activity promoting gaming, participants completed the training modes for bowling, tennis, and boxing on the Wii Sports computer game. During familiarisation participants wore an IDEEA (intelligent device for energy expenditure and activity) system.



Participants' mean resting energy expenditure and predicted energy expenditure when playing computer games