

Effects of Active Video Games on Metabolic and Cardiovascular Systems in Adults - Systematic Review

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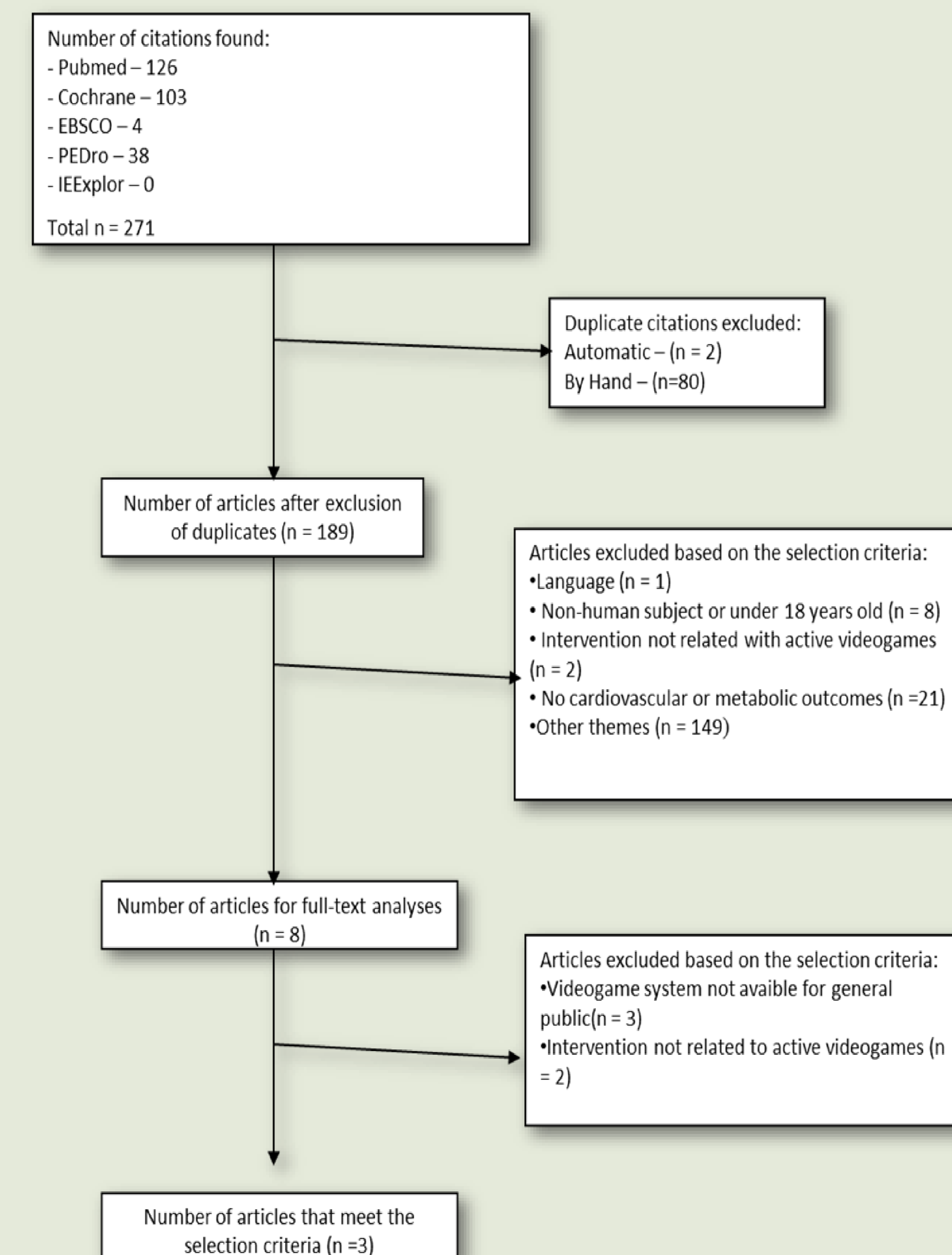
Introduction

In our society, the influence of technology is growing fast and its use occupies a large amount of time during the general population's daily life, which may lead to a sedentary lifestyle. Inactivity has been associated with several diseases like obesity, diabetes and heart disease. There is also reports that physical inactivity is associated with increase mortality, decreased quality of life, increased risk of osteoporosis, fractures, colon cancer, breast cancer and prostate cancer and psychiatric hospitalization. New technologies have been developed to promote physical activity, which can be named exergames or active video games. These systems combine video games with physical activity, and some authors reported that demonstrated the energy consumption during active video games suggests that this may be an appropriate intervention to decrease inactivity.

Objective

Systematically review the scientific evidence about the effects of exergames in the metabolic and cardiovascular systems in the adult population. Taking this into consideration we built the following PICO question "What are the effects of active video games on the metabolic and cardiovascular systems in adults?".

Methodology



Research and analysis of the articles included in this systematic review were prepared according to the protocol for conducting a systematic review based on the guidelines set by **PRISMA**.

The research expression was adapted for each database, according to the terms that produce results. Therefore, the final equation used to study the following was:

("middle aged" OR "middle aged women" OR "middle aged man" OR "middle age men" OR "middle age woman" OR "aged" OR "adult" OR "aged, 80 and over" OR "young adults" OR "geriatrics" OR "older" OR "elder" OR "old people" OR "old person" OR "older adults" OR "older age" OR "older population" OR "adult people" OR "middle ages" OR "middle age adults") NOT (Child OR adolescent OR Pediatrics) AND ("video games" OR exergames OR "nintendo wii" OR wii OR "wii fit" OR "wii balance board" OR playstation OR xbox OR "user-computer interface" OR "gaming systems" OR "active video game" OR "commercial off-the-shelf" OR "active computer games" OR consoles OR "game consoles" OR "active games") AND ("cardiovascular system" OR "body weight" OR calorimetry OR "heart rate" OR "oxygen consumption" OR physiology OR "exercise tolerance" OR "physical fitness" OR exercise OR "energy metabolism" OR "Circulatory and Respiratory Physiological Phenomena" OR "Blood Physiological Phenomena")

All the results were imported into a reference manager (EndNote® X5).

After we obtained the final sample, we analyzed the methodological quality of the selected study's using the **PEDro scale** and completed the analysis grid for each item. In all the steps each article was analyzed independently by two members of the group. The study was completed in June 2012.

Results

Title	Study Sample	Variables	Intervention	Main Results
Comparison of acute exercise responses between conventional video gaming and isometric resistance exergaming.	Male students between 18 and 30 years old (n=32).	Dependent: Heart rate, oxygen uptake, energy expenditure and rate of perceived exertion. Independent: Active videogaming, with and without isometric resistance; Active videogaming with isometric resistance with or without competition between subjects.	30 minutes of gaming alone or against a randomly assigned opponent from the same group, using the Exerstation.	Significant higher oxygen uptake and energy expenditure was found in the experimental group. There were no significant differences in heart rate and rate of perceived exertion between groups.
Improving physical fitness of individuals with intellectual and developmental disability through a Virtual Reality Intervention Program	Men and women between 35 and 60 years old, with cognitive impairment and developmental disabilities, that require a walking aid or a wheel chair (n=60).	Dependent: physical fitness, which includes heart rate, energy expenditure and walking distance. Independent: Active videogaming.	Three 30 minutes sessions, for 6 weeks, in which they played one of 5 available games in Sony Playstation II Eye Toy®.	Significant differences were found between the experimental and control group in the Total Heart Beat Index and the Modified Cooper Test. No significant differences were registered between groups for the Energy Expenditure Index.
The health benefits of interactive video game exercise	Men between 18 and 25 years old (n=14).	Dependent: physical fitness, cardiovascular endurance, Body Mass Index and arterial blood. Compliance to exercise and frequency of exercise were also measured. Independent: Physical exercise (cycling) with and without active videogaming.	30 minutes sessions, three times a week, for 6 weeks were optional, but recommended. Different Sony Playstation II® games were controlled while exercising on a bicycle.	Significant higher compliance to exercise was recorded in the experimental group. No significant differences were found on Body Mass Index between groups. Oxygen uptake was higher, and arterial blood pressure was significantly lower in the experimental group. Heart rate was lower in the experimental group. The authors state that compliance and motivation to exercise influence the physical outcomes.

- There were no significant differences in the blood pressure, perceived exertion and maximum heart rate, so there is no strong evidence of the effects active video games on the cardiovascular system.
- Results suggest that active video games can increase energy consumption compared to conventional video games. Body composition and anthropometric measurements by BMI and bioelectrical impedance showed no significant differences for any of the groups in just six weeks.
- Several studies have reported that levels of adherence observed in this kind of video games lead to better results in the variables studied, when compared to conventional physical activity.

Conclusions

Examining the results, consensus is established, regarding the impact of video-games in energy consumption. However there isn't sufficient evidence to reach conclusions about the other parameters. The studies did not show homogeneity, which makes it impossible to generalize the results to the population. More RCT's are needed to reach significant conclusions, concerning the efficacy of active video-games in the metabolic and cardiovascular systems of adults, revealing the importance and necessity of future studies in this area.

References

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