

## Chapter 13

# Promoting Physical Activity and Fitness with Exergames: Updated Systematic Review of Systematic Reviews

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### **ABSTRACT**

*This updated systematic review of systematic reviews evaluates the effectiveness of exergaming on physical fitness and physical activity. A systematic literature search was conducted on 10 databases, first in 2014 and then repeated in 2016. In total, 1040 and 287 articles were identified. 68 and 31 articles were found potentially relevant and selected for closer screening. The quality of all relevant articles was evaluated using the AMSTAR tool. After the duplicates were removed and inclusion, exclusion, and quality criteria were implemented, six and three articles remained for review. The results indicate that exergaming is generally enjoyed and can evoke some benefits for physical fitness and physical activity, but the current evidence does not support the ability of exergaming to increase physical fitness or physical activity levels sufficiently for significant health benefits. This systematic review also revealed gaps in previous research. Additional high-quality research and systematic reviews concerning exergaming are needed.*

### **INTRODUCTION**

Changes in society have led to a significant decrease in the level of physical activity of people during the past decades. One of the major changes has been the growing popularity of leisure time sedentary activities brought about by new media solutions such as television viewing, computer use, and video gaming (Matthews et al., 2008; Matthews et al., 2012). Sedentary activities have been shown to be a distinct risk factor for several adverse health outcomes among both adults (e.g. Matthews et al., 2012; Thorp, Owen, Neuhaus, & Dunstan, 2011) and children (e.g. Saunders, Chaput, & Tremblay, 2014; Tremblay et al., 2011).

DOI: 10.4018/978-1-5225-1817-4.ch013

The health consequences of physical inactivity as well as the health benefits of physical activity are well established (e.g. Lee et al., 2012; Warburton, Nicol, & Bredin, 2006; World Health Organisation [WHO], 2010, p. 10). Physical inactivity is a severe public health problem. It has been identified as the fourth most significant risk factor for global mortality (WHO, 2010, p. 10), and several studies have presented evidence on the increasing healthcare costs caused by physical inactivity (e.g. Kohl et al., 2012; Lee et al., 2012). Thus, physical inactivity is not just an individual problem but also a societal one, and due to its importance from the perspective of both public health and finance, finding new ways to promote physical activity and prevent physical inactivity is vital.

At the same time, the popularity of video gaming is on the rise. It has already become one of the most popular entertainment mediums in the world (Maddison et al., 2013), and market research firm Newzoo (2015) estimates that the worldwide market for video games will increase from US\$83,6bn (2014) and US\$91,5bn (2015 estimate) to US\$113,3bn by 2018. This raises an interesting question about whether video games could be utilised as a medium to promote physical activity.

## **BACKGROUND**

In recent years, a new form of video gaming that combines exercise and games has emerged. This type of gaming has been called by different terms such as ‘exergaming’, ‘active gaming’, or ‘active video gaming’ (AVG). They all refer to digital gaming that requires physical effort from the player in order to play the game, with the outcome of the game being mainly determined by these physical efforts (Mueller et al., 2011). Kari and Makkonen (2014, p. 2) provide a definition of exergaming as follows: “a form of digital gaming requiring aerobic physical effort – exceeding sedentary activity level and including strength-, balance-, or flexibility-related activity – from the player that determines the outcome of the game”. Exergames are played in all age groups, but it seems that playing is more common among the younger age groups than the older (Kari, Makkonen, Moilanen, & Frank, 2013). The popularity of exergaming seems to be equal between men and women (Kari, Makkonen, Moilanen & Frank, 2012; Kari, 2015) and also between different physical activity background groups (Kari, 2015). However, the more active a person is in playing any digital games the more active he or she is also in exergaming (Kari, 2015).

The widespread familiarity and allure of video games makes exergaming an interesting research area, for example, in terms of promoting a more active and healthier lifestyle (Maddison et al., 2013). During the recent years, researchers have become increasingly interested in exergaming and especially in its effects on physical fitness and physical activity levels.

This study is an updated systematic review of systematic reviews and meta-analyses of exergaming published in the fields of information systems and healthcare. The first version of this study was published in 2014 (Kari, 2014). This updated study covers the additional literature published since the original version. The objective is to form a wide range view of the effects that exergaming activities have on physical fitness (PF) and physical activity (PA) levels and also to identify gaps in previous research. More precisely, the aim is to answer the following research questions:

1. What levels of exertion are typical for exergaming?
2. Can exergaming contribute to increasing physical activity?
3. Can exergaming be used to increase physical fitness?

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