

Exergames in Childhood Obesity Treatment

Subjects: Others

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In the last decade, active video games (exergames) have been proposed in obesity prevention and treatment as a potential tool to increase physical activity.

Keywords: obesity ; overweight ; children ; adolescent ; exergames ; active games ; weight loss

1. Introduction

In the last four decades, the prevalence of obesity among children and adolescents aged 5–19 years increased from 0.8% to 6.8% globally ^[1]. The World Health Organization (WHO) estimated that 124 million children and adolescents were obese in 2016 ^[2]. Childhood obesity is associated with early markers of cardiovascular disease, insulin resistance, sleep disorders, increased risk of fractures, menstrual irregularities in adolescent girls, and negative psychological effects ^{[2][3]}. Furthermore, obese children and adolescents are more likely to become obese adults and to encounter disability and premature death than normal weight peers ^{[2][3]}.

Prevention and treatment of childhood obesity are mainly focused on the promotion of both community-based policies, such as taxing unhealthy foods or increasing physical exercise at school, and individual behavioral changes such as reducing excess calorie intake or screen time ^[3]. In recent years, exergames (or active video games) have been proposed in obesity prevention and treatment as a potential tool to increase physical activity ^{[4][5][6]}. Exergames are video games that require physical activity to interact with images on a screen through a technology based on the tracking of body movements, contrarily to passive video games that are played in a sitting position ^[7]. Many studies have analyzed the effects of exergames on children and adolescents' physical activity level or energy expenditure, suggesting that they can decrease sedentary time and anthropometric measures and increase metabolic equivalents, oxygen consumption and heart rate ^{[4][5][6][7]}.

We performed a systematic review of the available literature focused on this particular item. In order to obtain more specific and valid findings, only controlled intervention studies were included in the analysis.

2. Exergames in Childhood Obesity Treatment

Notwithstanding the strictness of the inclusion criteria, the selected studies were not homogeneous for duration, setting and type of intervention, nor for frequency of active game sessions and outcomes considered. Most importantly, their results were not consistent. Seven out of ten studies reported better outcomes in children/adolescents involved in the interventions ^{[8][9][10][11][12][13][14]}. Four of them detected significant differences between groups ^{[11][12][13][14]} and one showed significant improvements in the intervention group ^[9]. Three studies detected better outcomes in control groups ^{[15][16][17]}, one of which detected significant change ^[16]. A reduction in the proportion of fat mass was registered in the half of the examined interventions ^{[8][9][10][11][14]}, while the other five did not measure this variable. A decrease in BMI z-score was detected in three studies ^{[9][13][16]} out of six that considered this outcome.

Unfortunately, although the majority of the selected studies seems to support the effectiveness of active video games in weight management, the results of our review do not allow to resolve these doubts so far. To date, the available literature is still insufficient and heterogeneous to express definitive conclusions.

The limitations of this review are related with these issues. First of all, the analyzed studies differ in duration and frequency of the exergaming interventions. This limited their comparison and the characterization of the effects of time and exercise volume. Exergaming, so as traditional exercise, may require a long enough period to impact body weight. Therefore, it is possible that the length and the volume of the intervention may have a role in determining its effectiveness. Nevertheless, it should be noted that children and adolescents are engaged in physical growth. It is possible that the

longer the duration of the intervention, the greater might have been the influence of growth on weight-related outcomes. With regard to this, fat mass and BMI z-score can represent more reliable outcomes to evaluate changes in adiposity, but they have not been considered in all the examined interventions.

Furthermore, even the approach to exergames was different in the selected studies: some of them encouraged their use instead of inactive video games at home, relying on participants' compliance, while other included supervised sessions. Although no clear differences between these approaches were observed, this highlights the importance of considering the context where the intervention is performed, since several setting-related environmental, technological, and organizational factors may influence its effectiveness. Furthermore, existing exergames do not offer workouts adjusted to individual fitness and are normally stationary. From this perspective, the new digital media may offer promising solutions such as smartphone-based mobile games that can be played everywhere, increasing exercise opportunities.

Active video games offer interesting research fields to be explored by researchers and healthcare professionals engaged in childhood obesity treatment. Due to the importance of fighting sedentarism in the management of childhood obesity, which represents a particularly critical issue during the ongoing COVID pandemic, they might represent a useful tool to prevent prolonged sitting in obese youth, and to counteract possible compensatory behaviors induced by exercise programs. However, it is not yet possible to define to what extent its role may be useful in weight management, and which may be the most effective approach. The availability of further controlled studies reporting similar interventions and measuring outcomes that take into consideration the growth process is needed to achieve a valuable comparison and clear conclusions. In the meantime, a prudent approach represents probably the best strategy in this field.

3. Conclusions

A possible positive effect of active video games on weight-related outcomes in obese children and adolescents. However, due to the limited number and the diversity of the available studies, it is not yet possible to define if they can be effective enough to sustain weight loss and improve body composition in childhood obesity treatment.

From a public health perspective, considering the wide acceptability of exergames among youth, they may represent a useful tool to fight sedentarism and promote physical activity in obese children and adolescents. The continuous progress in new technologies opens up new horizons in this field. Therefore, further high-quality research is needed, focusing on new digital game potentiality.

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