

Active video games to promote physical activity in children and youth: a systematic review

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CRD summary

This review concluded that active video games enabled light to moderate physical activity in young people, but there was limited evidence on their long-term efficacy for physical activity promotion. The cautious conclusions and recommendations for further research reflect the limited evidence presented by the authors.

Authors' objectives

To review levels of metabolic expenditure and changes in activity patterns associated with active video game play in children and to provide directions for future research.

Searching

The authors searched PubMed, Web of Knowledge and Scholars Portal (1 January 1998 to 1 January 2010) for published studies in English. Search terms were detailed in the report. Additional studies were identified from bibliographies.

Study selection

Eligible studies needed to be of young people (21 or younger) and report on energy expenditure during active video game play, promotion of physical activity through active video game play, physiological risks and benefits of active video game play or enjoyment of and motivations for active video game play. Articles that targeted virtual reality rehabilitation, cognitive or behavioural therapies or health education via computer and video games were excluded. Studies that used video games or TV as distracters during exercise were excluded. Analyses were restricted to commercially available mainstream active video games and systems.

In the included studies, children varied in age and body mass index (BMI). Most samples had male and female participants. Active video games were compared variously with inactive gaming, treadmill walking, cycling without a video game, sitting, TV viewing and waiting list. Some studies compared upper limb and total body movement in gaming. Not all studies had a comparison group. Studies that explored the potential of active video games for promotion of physical activity ranged from one to 28 weeks.

Two reviewers were involved in the selection of studies for the review.

Assessment of study quality

Two reviewers extracted methodological details and assessed the quality of randomised controlled trials (RCTs) using the PEDro evaluation scale, which included items on treatment allocation, blinding and drop-out rates.

Data extraction

Two reviewers extracted data for this review.

Methods of synthesis

Studies were synthesised narratively.

Results of the review

Eighteen reports of 17 studies were included in the review (n=440 children plus 20 adults). Pedro scores for three RCTs ranged from four to six. All studies had small sample sizes (n=11 to 60 and only two studies with more than 40 participants).

Energy expenditure during active video game play was found to be highly variable with percentage increases from rest that ranged from 100% to 400% with a mean of 222% (100%). Percentage increases in heart rate varied from 26% to 98% with a mean of 64% (20%). Percentage increases in heart rate (-29%, 95% CI -47 to -11, p=0.03) and energy expenditure (-148%, 95% CI -231% to -66%, p=0.01) were significantly lower for games that primarily used upper body movements compared with those that engaged the lower body as well.

In terms of physical activity promotion, drop-out rates after 12 weeks ranged from zero to 41%. There was evidence from four studies of moderate increases in physical activity or decreases in sedentary time. Changes in physiological measures such as BMI were not statistically significant in two studies. Three studies noted a decrease in active video game play for various reasons, but two studies found that participants reported enjoyment of the active video game intervention. In three studies, group or competitive play with peers appeared to improve interest and participation in active video games.

Authors' conclusions

Active video games enabled light to moderate physical activity. Limited evidence was available to draw conclusions on the long-term efficacy of active video games for physical activity promotion.

CRD commentary

This review was based on defined inclusion criteria for participants, interventions and outcomes, but not for study designs. A number of sources were searched. Unpublished papers and those in languages other than English were ineligible which may have led to publication and language biases. Only RCTs were assessed for quality. RCTs appeared to be in the minority. Inadequate reporting of the quality of all studies hindered an evaluation of the reliability of the evidence. Two reviewers were involved in the processes of study selection, data extraction and validity assessment, which helped to minimise bias and error. A narrative synthesis was appropriate given the diversity of the studies.

The authors' cautious conclusions reflect the limited evidence provided.

Implications of the review for practice and research

Practice: The authors stated that participation in active video game play should not be regarded as a replacement for vigorous physical activity, but can increase energy expenditure from sedentary or passive video gaming levels to levels associated with light to moderate physical activity. Potential for active video game play significantly decreasing childhood physical inactivity was inconclusive.

Research: The authors made a number of recommendations for research. These included exploration of long-term adherence and efficacy of active video games, investigation of changes to sedentary and physical activity patterns, exploration of strategies to maintain interest and enthusiasm including group and competitive play, exploration of the safe use of active video games and injury rates, investigation of use of active video games for individuals with disabilities and determination of appropriate measures to evaluate fitness outcomes. Limitations in the design of studies should be addressed including using allocation concealment, blinding where possible and reporting of all outcomes.

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