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Exergame-based interventions and psychosocial outcomes in children and adolescents: a systematic review and exploratory meta-analysis protocol

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ADMINISTRATIVE INFORMATION

Support - No support.

Review Stage at time of this submission - Completed but not published.

Conflicts of interest - The authors declare no conflicts of interest, financial or non-financial, that may have influenced the conduct or reporting of this systematic review.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 22 May 2026 and was last updated on 22 May 2026.

INTRODUCTION

Review question / Objective The aim of this systematic review and exploratory meta-analysis is to evaluate the effects of exergame-based interventions on psychosocial outcomes in children and adolescents aged 6–18 years. The following research question guides the review: Among children and adolescents (aged 6–18 years), do exergame-based interventions produce improvements in psychosocial outcomes — including self-concept, self-efficacy, self-esteem, perceived competence, and well-being — compared to non-exergame control conditions?

Rationale Physical inactivity and body dissatisfaction are growing public health concerns among children and adolescents. Despite evidence linking physical activity with improvements in self-concept-related constructs, the specific psychosocial effects of exergames in pediatric populations remain insufficiently synthesized. Existing reviews focus predominantly on physical or cognitive outcomes, and studies vary substantially in design, intervention modality, duration, and outcome measures, precluding firm conclusions. This review addresses that gap by systematically synthesizing evidence from controlled trials on exergames and psychosocial outcomes, including an exploratory meta-analysis where data permit.

Condition being studied Psychosocial outcomes in children and adolescents, including self-concept (physical and global), self-esteem, self-efficacy related to physical activity, perceived competence, well-being, body image, and related constructs. The population of interest includes children and adolescents with normal weight, overweight, or obesity who participate in exergame-based interventions.

METHODS

Search strategy A comprehensive search was conducted across four electronic databases:

PubMed, Scopus, Web of Science (WoS), and ProQuest Sports Medicine & Education Index. The search was conducted on 3 March 2026 and limited to studies published from 2004 onward. No language restrictions were applied. The search strategy was based on the PICOT framework and combined the following terms using Boolean operators: ("child" OR "teen*" OR "adolescent*" OR "youth*") AND ("exergame*" OR "exergaming" OR "active videogame*" OR "active video games") AND ("self-esteem" OR "esteem" OR "self perception*" OR "self concept*" OR "well-being" OR "self-efficacy" OR "body image") This strategy was adapted to the syntax of each database. Duplicates were removed using Rayyan®. Manual screening of reference lists of included studies and relevant systematic reviews was performed to identify additional eligible records.

Participant or population Children and adolescents aged 6 to 18 years, with normal weight, overweight, or obesity, without physical, visual, auditory, or intellectual disabilities that could hinder task performance. Participants with cardiovascular, respiratory, renal, or musculoskeletal conditions requiring hospital-based physical exercise were excluded.

Intervention Exergame-based interventions, defined as interactive video games requiring gross motor activity to engage with gameplay. Interventions included dance-based exergames (e.g., Dance Dance Revolution, Just Dance), sports simulation exergames (e.g., Xbox Kinect Sports), walking and location-based exergames (e.g., Pokémon GO), and mixed or multi-modality active video game programs. Intervention duration was between 2 weeks and 6 months (maximum 24 weeks). Co-interventions that could confound the effect of exergaming (e.g., nutritional, additional exercise, or psychological interventions) were excluded.

Comparator Non-exergame control conditions, including passive control (no intervention), standard physical education, traditional exercise programs, or sedentary video game play, provided that participants did not receive the exergame intervention.

Study designs to be included Randomized controlled trials (RCTs), cluster-randomized trials, and controlled trials with a comparable non-intervention comparator group, including cluster quasi-experimental designs in which group assignment occurred at the classroom or school level.

Eligibility criteria Inclusion criteria: 1. Participants: children and adolescents aged 6–18 years, with normal weight, overweight, or obesity. 2. Study design: RCT, cluster-randomized trial, or controlled trial with a non-intervention comparator (including cluster quasi-experimental designs). 3. Intervention: exergame-based, with at least one eligible psychosocial outcome (self-concept, self-esteem, self-perception, self-efficacy, well-being, enjoyment, or body image). 4. Duration: 2 weeks to 6 months (maximum 24 weeks). Exclusion criteria: 1. Participants with physical, visual, auditory, or intellectual disabilities. 2. Exercise used exclusively as part of a rehabilitation protocol. 3. Participants with conditions requiring hospital-based physical exercise. 4. Co-intervention that could confound the exergame effect.

Information sources Electronic databases: PubMed, Scopus, Web of Science (WoS), and ProQuest Sports Medicine & Education Index. Additional sources: manual screening of reference lists of included studies and relevant systematic reviews. No grey literature or unpublished studies databases were searched.

Main outcome(s) Primary outcomes: self-concept (physical self-concept, global self-concept), self-esteem (global), self-efficacy related to physical activity, and perceived competence for exercise — assessed as between-group differences at post-intervention using validated instruments.

Additional outcome(s) Secondary outcomes: body image, well-being (psychological and emotional), enjoyment of physical activity, sociability, and trait emotional intelligence constructs with conceptual overlap with psychosocial self-perception. These were extracted and reported narratively where between-group statistics were available.

Data management Study selection was conducted independently by two reviewers using Rayyan® for blinded, parallel screening. Disagreements were resolved by consensus. Data extraction was performed by one reviewer and verified by a second. Jamovi (version 2.4; The Jamovi Project, 2024) was used for statistical analyses. Microsoft Excel was used for data management and tabulation.

Quality assessment / Risk of bias analysis Methodological quality was assessed using the Physiotherapy Evidence Database (PEDro) scale (Maher et al., 2003). Risk of bias in randomized trials was evaluated using the Revised Cochrane Risk-of-Bias Tool (RoB 2; Sterne et al., 2019),

focusing on the effect of assignment to intervention. For two cluster quasi-experimental studies, RoB 2 was applied as an approximation to enable uniform appraisal; their non-randomized nature is reflected in the high-risk rating for Domain 1. GRADE assessment was not conducted given the small number of eligible studies and the exploratory nature of the quantitative synthesis.

Strategy of data synthesis A narrative synthesis was conducted for all included trials. An exploratory quantitative synthesis was performed for trials reporting post-intervention means, standard deviations, and sample sizes for both groups. A single outcome per study was extracted according to a pre-specified hierarchy: (1) the most proximal indicator of self-concept, or (2) the most proximal indicator of physical activity self-efficacy when no self-concept indicator was reported. Standardized mean differences (Hedges' g) with 95% confidence intervals were computed, and pooled effects estimated using a random-effects model with restricted maximum-likelihood estimation. Heterogeneity was characterized using Cochran's Q, I^2, and τ^2. A 95% prediction interval was calculated when τ^2 exceeded zero. Outlier and influence diagnostics were conducted using externally studentized residuals and Cook's distances. Given $k < 10$ effect sizes, funnel-plot asymmetry tests were reported descriptively only and not formally interpreted.

Subgroup analysis No formal subgroup analyses were pre-specified given the small number of eligible studies ($k = 6$). Exploratory comparisons by exergame modality (dance, sports, walking/location-based, mixed) and supervision level (supervised vs. unsupervised) were described narratively.

Sensitivity analysis No formal sensitivity analyses were conducted given the small number of effect sizes included in the quantitative synthesis ($k = 4$ from 3 independent trials). The exploratory nature of the meta-analysis and the acknowledged deviation from the one-outcome-per-study rule (two effect sizes from Wagener et al., 2012) are reported as limitations; a sensitivity analysis retaining only one outcome per study is recommended for future work.

Language restriction No language restrictions were applied to the search strategy.

Country(ies) involved Chile, Australia.

Other relevant information The review protocol was registered retrospectively following completion of the review, as explained in Item 4. The PRISMA 2020 guidelines were followed throughout. The quantitative synthesis is presented as exploratory and complementary to the narrative synthesis, not as a confirmatory meta-analytic estimate, given the small number of eligible trials and their high risk of bias. Key references: Maher CG et al. (2003). Phys Ther, 83(8):713–721. Sterne JAC et al. (2019). BMJ, 366:l4898. Page MJ et al. (2021). BMJ, 372:n71. Borenstein M et al. (2009). Introduction to Meta-Analysis. Wiley. Higgins JPT et al. (2019). Cochrane Handbook (2nd ed.). Wiley.

Keywords exergames; active video games; self-concept; self-efficacy; self-esteem; psychosocial outcomes; children; adolescents; systematic review; meta-analysis.

Dissemination plans The results of this systematic review will be submitted for publication in a peer-reviewed journal indexed in Springer Nature (or equivalent publisher). Findings will also be presented at national or international conferences in the fields of physical activity, pediatric health, and sport sciences.

Contributions of each author

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