

INPLASY202570089
doi: 10.37766/inplasy2025.7.0089
Received: 22 July 2025
Published: 23 July 2025

Corresponding author:
Fangyuan Jing

jingfy@zjsru.edu.cn

Author Affiliation:
Zhejiang Shuren University.

Dose-response meta-analysis about the effect of physical activity on blood pressure in children and adolescents

Yuan, HT; Shao, WY; Ren, YN; Jiang, MM; Kong, JX; Jing, FY.

ADMINISTRATIVE INFORMATION

Support - Scientific Research Foundation for Introduced Talents of Zhejiang Shuren University.

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

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202570089

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 23 July 2025 and was last updated on 23 July 2025.

INTRODUCTION

Review question / Objective Current systematic review and meta-analysis aimed to offer a comprehensive evaluation of the evidence linking PA intervention to BP reduction in children and adolescents.

Condition being studied The noticeable increase in the prevalence of elevated blood pressure (BP) among children and adolescents has been a public health concern. Although physical activity (PA) intervention has been widely applied in children BP controlling programs, the effectiveness of PA intervention in adolescents over 12, the dose-response relationship between PA intervention and BP and the optimal dose of exercise required for BP lowering are all remained unclear.

METHODS

Search strategy According to PRISMA and MOOSE guidelines, we conducted a systematic

review. We searched PubMed, Embase, MEDLINE Complete, Web of Science, and the Cochrane Library up to Feb 24, 2025, for randomized controlled trials examining the association between physical activity intervention and blood pressure in children and adolescents.

Participant or population Children and adolescents aged between 6 and 24 years.

Intervention Any type of physical activity intervention(not daily).

Comparator No physical activity intervention.

Study designs to be included Randomized controlled trial.

Eligibility criteria Studies were included if they met all of the following inclusion criteria: 1) Patients had not received any medication or other intervention measures prior to the study; 2) Participants were aged between 6 and 24 years; 3)

The intervention period lasted for at least one month; 4) The study design was a randomized controlled trial (RCT).

Information sources We searched PubMed, Embase, MEDLINE Complete, Web of Science, and the Cochrane Library up to Feb 24, 2025.

Main outcome(s) The following information was included: participant and trial characteristics to determine their association with physical activity interventions and blood pressure. Blood pressure values were extracted as means and standard errors (or standard deviations). Information on metabolic equivalent (MET), such as intervention type, frequency, intensity, and duration, was also extracted from each article.

Quality assessment / Risk of bias analysis Risk of bias was assessed using the Cochrane risk-of-bias tool for randomized trials. Studies with low risk of bias in key domains—random sequence generation, allocation concealment, and missing participant outcome data—were classified as low overall risk of bias, while others were considered high risk. Two investigators independently reviewed each study. Discrepancies in evaluation were resolved by a third reviewer through consensus.

Strategy of data synthesis Pooled weighted mean differences (WMD) and 95% confidence intervals (95% CI) for the main outcomes of included studies were calculated using a random-effects model. Standard errors were calculated from sample sizes when not provided in the original articles. Restricted cubic splines methods was used to assess the dose-response association between exercise equivalent MET and intervention effects. Funnel plots along with Egger's test were applied to assess the impact of potential publication bias on the overall effect size. Heterogeneity tests were performed to assess variability among studies, and Kendall's tau test was used to assess inter-study agreement.

Subgroup analysis Subgroup analyses were performed in which we preselected four main moderators: BMI, age of children and adolescents, duration of intervention, and gender.

Sensitivity analysis The Leave-One-Out method was used to assess the stability of results by excluding one article at a time.

Language restriction English.

Country(ies) involved China.

Keywords Physical activity, Children and adolescent, Blood pressure, Meta-analysis.

Contributions of each author

Author 1 - Hengtai Yuan.

Author 2 - Wenying Shao.

Author 3 - Yanan Ren.

Author 4 - Minmin Jiang.

Author 5 - Jingxia Kong.

Author 6 - Fangyuan Jing.