

INPLASY

The impact of physical activity on inhibitory control of adult ADHD: a systematic review and meta-analysis

INPLASY202490109

doi: 10.37766/inplasy2024.9.0109

Received: 25 September 2024

Published: 25 September 2024

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ADMINISTRATIVE INFORMATION

Support - General Projects of the Humanities and Social Sciences Fund of the Ministry of Education, 20YJA890018.

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

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202490109

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 25 September 2024 and was last updated on 25 September 2024.

INTRODUCTION

Review question / Objective Exploring the effect of physical activity on inhibitory control of adult ADHD using meta-analysis method.

Rationale According to the PRISMA principle, databases such as PubMed, Web of Science, CNKI, and VIP were searched to collect randomized controlled trials (RCTs) on the inhibitory control effects of physical activity on adult ADHD. The methodological quality of the included studies was evaluated using RCT bias risk assessment criteria, and heterogeneity analysis and potential publication bias analysis were conducted using Revman 5.4 software.

Condition being studied Attention Deficit Hyperactivity Disorder (ADHD) is often considered

a neurodevelopmental disorder characterized by symptoms of inattention, hyperactivity, and impulsivity. According to statistics, the global prevalence of persistent adult ADHD in 2020 was 2.58%, and the prevalence of symptomatic adult ADHD was 6.76%. ADHD is a complex disease, and according to a global study, 23% of ADHD patients suffer from comorbidities, mainly including mood disorders, anxiety disorders, substance use disorders, and other behavioral disorders (such as impulse control disorders and antisocial personality disorders), which impose a huge burden on society and families. As is well known, ADHD is one of the most common neurodevelopmental disorders in early childhood, but its effects extend beyond childhood to adulthood, with about one-fifth of adult patients still meeting the diagnostic criteria for the disease. Patients suffer from the three core problems of difficulty concentrating, hyperactivity, and impulsive behavior, and.

METHODS

Search strategy Two researchers used databases such as PubMed, Web of Science, Embase, Cochrane Library, China National Knowledge Infrastructure (CNKI), and VIP to search for Chinese keywords based on the "PICOS" principle, including adult ADHD, ADHD symptoms, physical activity, exercise intervention, cognitive function, executive function, inhibitory control, etc; The English search terms include: Adult ADHD, ADHD symptoms, Physical activity, Exercise intervention, Exercise therapy, Cognitive function, Executive function, Inhibitory control, RCT, Simultaneously conducting a search using "subject words+free words". The literature search period is from January 1, 2000 to September 1, 2024.

Participant or population Adult ADHD.

Intervention For example, physical activities such as running, cycling, yoga, etc.

Comparator Adult ADHD without physical activities such as running, cycling, yoga, etc.

Study designs to be included Randomized controlled trial.

Eligibility criteria The inclusion criteria for the literature are: 1) The research subjects are composed of adults aged 18 and above; 2) The experimental group has a strict exercise prescription design, and the intervention methods include various types of physical activities, including game activities, sports activities, physical activities, and fitness activities. The control group can participate in daily activities or not intervene; 3) The design of exercise prescriptions follows the standards of the American College of Sports Medicine (ACSM). 4) The experimental research design should be a randomized controlled trial (RCT) study. 5) The evaluation indicators mainly include cognitive ability, executive function, working memory, inhibitory control, and other aspects.

The exclusion criteria for literature are: 1) non English or non Chinese literature; 2) Non experimental studies and control group studies without pre - and post tests; 3) Literature unrelated to exercise prescription, adult ADHD, and cognitive function; 4) Review, thesis, conference paper, qualitative research, and literature for which research data is not available.

Information sources PubMed, Web of Science, Embase, Cochrane Library, China National

Knowledge Infrastructure (CNKI), and VIP databases.

Main outcome(s) Related indicators of inhibitory control function.

Quality assessment / Risk of bias analysis Use the Cochrane systematic review's "bias risk assessment" tool to evaluate the quality of the included studies.

Strategy of data synthesis Use Review Manager 5.4 software to analyze the outcome measures of the 12 included literature. The results of this study were all continuous variables, and different tools such as Stroop Test and Flanker Task were used to test the outcome indicators. Therefore, standardized mean difference (SMD) was used to calculate the effect size, with a 95% confidence interval and $P \leq 0.05$ indicating statistical significance.

Subgroup analysis This study conducted a subgroup analysis on the inhibitory control of adult ADHD using two different types of physical activity variables, acute exercise and chronic exercise, as well as intervention variables such as cycling and yoga.

Sensitivity analysis Sensitivity analysis was conducted on the 8 included articles, and methods such as excluding individual articles one by one and changing analysis methods were adopted to re-examine the size and changes of the effect size. The results show that excluding individual studies does not have a significant impact on the outcome indicators, indicating that the meta-analysis results of this study have a certain degree of credibility.

Country(ies) involved China.

Keywords Physical activity; Adult ADHD; Cognitive function; Inhibition control; Meta analysis.

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