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The Impact of Core Training on Overall Athletic Performance in Different Sports: A Comprehensive Meta-Analysis

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ADMINISTRATIVE INFORMATION

Support - This meta-analysis is not financially supported by any organization or sponsor.

Review Stage at time of this submission - Preliminary searches.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 11 October 2024 and was last updated on 11 October 2024.

INTRODUCTION

Review question / Objective This systematic review and meta-analysis aim to comprehensively investigate and quantify the impact of core training on overall athletic performance across different sports. The meta-analysis will focus on how the impact of core training on overall athletic performance is moderated by variables such as intervention duration, training frequency, athlete age, and athlete level (amateur vs. professional). The review seeks to address the following question: What is the effect of core training on overall athletic performance across different sports, and how is this effect moderated by select moderating variables?

Rationale While core training has gained popularity in athletic training programs, its effectiveness on overall athletic performance across sports remains controversial, especially taking into account moderating factors such as

training intervals, training protocols, and athlete level among others. Previous meta-analyses have focused on specific athletic performance measures or sports comparing core training to control groups. A comprehensive synthesis of core training's impact on overall athletic performance across sports and athlete levels as well as the resultant differences as influenced by moderating factors is lacking. This review aims to fill this gap and provide evidence-based recommendations for athletes, coaches, and researchers on how to implement core training strategically.

Condition being studied This review will examine the effect of core training on overall athletic performance in healthy athletes across various sports.

METHODS

Search strategy We will search the following databases: PubMed, Web of Science, Scopus, SPORTDiscus, and Google Scholar. The search

strategy will include terms related to core training ("core training", "core strength training", "core stability training") combined with terms related to athletic performance and specific sports ("athletic performance", "sports performance", "skill performance") focusing on randomized controlled trials or controlled trials. The full search strategy for each database will be developed, refined, and reported in the final review.

Participant or population Healthy athletes of any age, gender, or competitive level participating in organized sports will be included. Studies involving injured athletes or non-athletic populations will be excluded.

Intervention Core training interventions of any duration or frequency will be included. This may involve exercises targeting the abdominal, lower back, and hip muscles, performed with or without equipment.

Comparator The comparators will be traditional training methods, no intervention, or placebo interventions.

Study designs to be included Randomized controlled trials (RCTs) and controlled clinical trials will be included.

Eligibility criteria Inclusion criteria: (1) RCTs or controlled clinical trials; (2) healthy athletes; (3) core training intervention; (4) comparison with traditional training or no intervention; (5) reporting at least one measure of overall athletic performance; (6) articles published from 2014 to date (10 years).

Exclusion criteria: (1) non-English language publications; (2) studies on injured athletes; (3) studies without a control group; (4) nonhuman studies; (5) studies not reporting quantitative performance outcomes.

Information sources The review will adopt the PRISMA statement as the basis for resource selection. PubMed, Web of Science, EBSCOhost, Scopus, SPORTDiscus, and Google Scholar will be searched to derive the studies to be included in the review.

Main outcome(s) The primary outcome will be overall athletic performance, as measured by validated tests specific to each sport such as power, speed, agility, and other sport-specific skills such as throwing accuracy in baseball and shooting accuracy in basketball. We will account for every athletic performance measure assessed by the studies that meet the inclusion criteria and

analysis outcomes that are predominant in most sports assessed.

Additional outcome(s) Secondary outcomes may include core muscle endurance, balance, and other general athletic performance measures.

Data management Two independent reviewers will screen titles and abstracts, followed by a full-text review. Disagreements will be resolved by discussion or consultation with a third reviewer. Data extraction will be performed using a standardized form. RevMan software will be used for data management and analysis.

Quality assessment / Risk of bias analysis The PEDro scale will be used to assess the methodological quality of included studies. The Cochrane Risk of Bias (RoB) tool will be used to assess the risk of bias while the Grading of Recommendations Assessment, Development, and Evaluation approach (GRADE) approach will be used to evaluate the overall quality of evidence for each outcome.

Strategy of data synthesis The effect sizes (Cohen's d) for each study will be calculated. If sufficient homogeneous data are available, a random-effects model for meta-analysis will be conducted. Standardized mean differences (SMD) with 95% confidence intervals will be calculated for continuous outcomes. Heterogeneity will be assessed using the I^2 statistic. If substantial heterogeneity is found, we will explore potential sources through subgroup and meta-regression analyses.

Subgroup analysis Subgroup analyses will be conducted based on: (1) the type of sport; (2) the athlete's competitive level; (3) the duration of intervention; and (4) the type of core training program.

Sensitivity analysis Sensitivity analyses will be performed by excluding studies with a high risk of bias and by using different statistical models (fixed-effect vs. random-effects).

Language restriction Only studies published in English will be included.

Country(ies) involved China.

Other relevant information None.

Keywords Core training; athletic performance; sport-specific skills; meta-analysis; systematic review.

Dissemination plans The results of this review will be submitted for publication in a peer-reviewed journal and presented at relevant sports science conferences.

Contributions of each author

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