INPLASY

Effects of Different Training Methods on Reaction Time in Soccer Players: A Systematic Review and Meta-Analysis

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ADMINISTRATIVE INFORMATION

Support - None.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 1 February 2025 and was last updated on 1 February 2025.

INTRODUCTION

*R*eview question / Objective This systematic review and meta-analysis aims to evaluate the effects of different training methods on reaction time in soccer players. Specifically, we seek to determine whether cognitive, neuromuscular, or physical training interventions improve reaction time performance compared to no training or alternative training methods.
Using the PICOS framework:
Population (P): Soccer players of any skill level (amateur, professional, or youth).
Intervention (I): Different training methods, including Speed Agility Quickness training, Small-sided games training, vision training.
Comparison (C): No training, traditional training, or alternative intervention.
Outcome (O): Change in reaction time, measured through validated reaction time tests (e.g., choice reaction time, or sport-specific reaction tests).
Study Design (S): Randomized controlled trials (RCTs).

Rationale This review follows the PRISMA guidelines and aims to synthesize existing evidence to provide recommendations for optimizing training protocols to enhance soccer players' reaction time.

Condition being studied Reaction time is a crucial component of soccer performance, influencing a player's ability to respond quickly to dynamic game situations, such as passing, shooting, defending, and decision-making under pressure. The ability to react swiftly to visual, auditory, or proprioceptive stimuli can significantly impact match outcomes.
In this study, we focus on how different training methods—such as cognitive training, neuromuscular training, and physical conditioning—affect reaction time in soccer players. Reaction time can be classified into simple reaction time (SRT), where a player responds to a single known stimulus, and choice reaction time (CRT), where the player must choose an appropriate response among multiple stimuli. Faster reaction time is

often associated with improved motor coordination, decision-making efficiency, and overall athletic performance.

Given that reaction time is closely linked to neuromuscular processing, cognitive function, and motor execution, training interventions aimed at improving these factors may enhance a player's competitive ability. This systematic review and meta-analysis will assess whether specific training methods effectively enhance reaction time and provide evidence-based recommendations for soccer training programs.

METHODS

Search strategy A comprehensive literature search was conducted in the following electronic databases: PubMed, Web of Science, Scopus, SPORTDiscus and Google Scholar.

The search included the following keywords and Boolean operators:

("SAQ training or Speed Agility Quickness training or ssg training or small-sided game training or vision training or Visual training") AND ("Soccer player* or football player* or soccer athlete* or football athlete*"") AND ("Reaction Time* or Response Time* Response Speed or Cognition or Cognitive performance or Responsive or Responsiveness").

Filters will be applied to include randomized controlled trials (RCTs), studies published in English. The search covered studies from database inception to November 6, 2024. To ensure a comprehensive review, additional manual searches were performed in relevant systematic reviews and reference lists to identify any missing studies.

Participant or population This review focuses on soccer players of any competitive level, including amateur, semi-professional, and professional players, as well as youth and adult athletes.

Eligible participants include both male and female players from any geographic region. Studies involving players with neurological disorders, musculoskeletal injuries, or other medical conditions affecting reaction time will be excluded. This review aims to analyze how different training methods influence reaction time in healthy soccer players to provide evidence-based insights for performance optimization.

Intervention This review evaluates the effects of three training methods on reaction time in soccer players:

Speed, Agility, and Quickness (SAQ) Training – Drills aimed at improving rapid movement, coordination, and reaction speed.

Small-Sided Games (SSG) Training – Modified soccer matches (e.g., 3v3, 5v5) to enhance decision-making and reaction time in game-like conditions.

Vision Training – Exercises to improve visual perception, peripheral awareness, and quick decision-making.

These interventions will be compared to no training, traditional training, or alternative interventions to assess their impact on reaction time.

Comparator No Training – Participants who do not undergo any specific reaction time training.

Traditional Soccer Training – Standard soccer drills focusing on technical, tactical, and physical conditioning without a targeted reaction time component.

These comparators will help determine the effectiveness of the selected interventions in improving reaction time in soccer players.

Study designs to be included This review will include Randomized Controlled Trials (RCTs).

Eligibility criteria Inclusion Criteria:

Studies involving soccer players of any skill level (amateur, professional, or youth).

Studies evaluating the effects of Speed, Agility, and Quickness (SAQ) training, Small-Sided Games (SSG) training, or Vision Training on reaction time.

Randomized Controlled Trials (RCTs) with a clear comparator (e.g., no training, traditional training, or alternative interventions).

Studies using validated reaction time assessment methods (e.g., choice reaction time tests, sport-specific reaction tests).

Published in English.

Exclusion Criteria:

Studies involving players with neurological disorders, musculoskeletal injuries, or medical conditions affecting reaction time.

Studies without a control or comparison group.

Non-experimental studies, case reports, reviews, conference abstracts, or non-peer-reviewed articles.

Information sources Studies were retrieved from PubMed, Web of Science, Scopus, SPORTDiscus and Google Scholar. Additional sources included reference lists of relevant reviews and manual searches of key journals. The search was completed on November 6, 2024.

Main outcome(s) The primary outcome is reaction time improvement, measured by choice reaction time (CRT) tests and sport-specific reaction tests. Effect measures include mean differences,

standardized mean differences (SMD), and confidence intervals (CI).

Quality assessment / Risk of bias analysis The Cochrane Risk of Bias (RoB 2.0) tool will assess RCT quality. Additionally, the Grading of Recommendations, Assessment, Development, and Evaluations (GRADE) framework will be used to evaluate the certainty of evidence. Studies will be rated as high, moderate, low, or very low certainty based on risk of bias, inconsistency, indirectness, imprecision, and publication bias.

Strategy of data synthesis A meta-analysis will be performed using Standardized Mean Differences (SMD) with 95% Confidence Intervals (CI). Heterogeneity (I^2 statistic) will determine the use of fixed- or random-effects models. If a meta-analysis is not feasible, a narrative synthesis will summarize the findings.

Subgroup analysis Analyses will be based on player level (amateur/professional/youth), training type (SAQ, small-sided games, vision training), and study quality to explore variations in effects.

Sensitivity analysis A sensitivity analysis will be conducted by excluding studies with high risk of bias, small sample sizes, or methodological inconsistencies to assess the robustness of the results.

Country(ies) involved China.

Keywords Soccer; Reaction Time; Training; SAQ; Small-Sided Games; Vision Training; Meta-Analysis.

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