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INPLASY

Biomechanical Determinants of CrossFit Performance: A Scoping Review

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ADMINISTRATIVE INFORMATION

Support - No support.

Review stage at the time of initial registration - Completed but not published.

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 November 2026 and was last updated on 11 November 2026.

INTRODUCTION

Review question / Objective This scoping review aimed to map the scientific literature related to CrossFit performance, with particular emphasis on biomechanical, neuromuscular, and physiological determinants of performance, while identifying current research trends and gaps in the literature.

Background This scoping review aimed to map the scientific literature related to CrossFit performance, with particular emphasis on biomechanical, neuromuscular, and physiological determinants of performance, while identifying current research trends and gaps in the literature.

Rationale A scoping review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR). Searches were performed in PubMed, Web of Science, Google Scholar, SciELO, Europe PMC, and BASE. Studies published between 2018 and 2026 investigating CrossFit or High-Intensity Functional Training (HIFT) were considered.

METHODS

Strategy of data synthesis A comprehensive literature search was performed in six electronic databases: PubMed, Web of Science, Google Scholar, SciELO, Europe PMC, and BASE. The search included studies published between January 2018 and March 2026.
Population 1 "CrossFit" OR "High-Intensity Functional Training" OR HIFT
General Variables 2 performance OR physiology OR biomechanics OR strength OR power
Performance Context 3 "workout performance" OR benchmark OR Fran
Biomechanical Variables 4 squat OR "back squat" OR thruster OR biomechanics OR kinematics OR kinetics OR "force production"
Physiological Variables 5 VO_2max OR lactate OR "heart rate" OR fatigue OR "metabolic response"

Boolean Syntax 6 (#1 AND #2) OR (#1 AND #3 AND #4).

Eligibility criteria Published in peer-reviewed scientific journals;
Investigated physiological, neuromuscular, biomechanical, or performance-related determinants in CrossFit practitioners;
Included adult participants (≥18 years of age);
Assessed physiological, neuromuscular, biomechanical, or performance-related variables;
Employed experimental, observational, cross-sectional, cohort, or case-control study designs.
Reported outcomes related to exercise performance or physiological responses to CrossFit training.

Source of evidence screening and selection The literature search identified a total of 20,299 records across the electronic databases PubMed, Web of Science, Google Scholar, SciELO, Europe PMC, and BASE. After duplicate records were removed, 13,433 studies remained for title and abstract screening. Following the initial screening process, 13,393 records were excluded because they did not meet the predefined eligibility criteria. Consequently, 40 full-text articles were assessed for eligibility.
Following full-text review, 27 studies were excluded because they did not address the objectives of the present review or did not evaluate performance-related variables. Ultimately, 15 studies met all inclusion criteria and were included in the final synthesis.

Data management Data were extracted systematically using a standardized data extraction form to ensure consistency across studies. The information collected included the authors and year of publication, journal, study objectives, variables investigated, assessment methods, principal findings, and study conclusions. The extracted data were then summarized in a tabular format to facilitate comparison, thematic synthesis, and interpretation of the evidence.

Presentation of the results The available literature indicates that CrossFit is characterized by high physiological demands, substantial metabolic stress, and considerable neuromuscular requirements. Maximal strength, muscular power, and movement velocity consistently emerged as important factors associated with performance during benchmark workouts and other high-intensity functional training sessions.

Language restriction No language restriction.

Country(ies) involved Portugal.

Keywords CrossFit; biomechanics; HIFT; performance; resistance training; scoping review.

Contributions of each author
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