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Locomotor and mechanical demands analysis of Youth Soccer Players considering playing position and age-group: A Systematic Review with Evidence Gap Map

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ADMINISTRATIVE INFORMATION

Support - None.

Review Stage at time of this submission - Formal screening of search results.

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 15 May 2025 and was last updated on 15 May 2025.

INTRODUCTION

Review question / Objective This systematic review with Evidence Gap Map aimed to: Review and consolidate research that has investigated the physical demands and workload metrics measured through global positioning systems (GPS) or cameras in young soccer players during both training and matches to provide a better comprehensive synthesis of GPS-derived outcomes considering how playing position varies the locomotor demands of young footballers and help scientists, coaches and readers to understand different age-group segmentation and evolution of youth soccer physical demands.

Rationale Physical demands and workload metrics refer to the external loads experienced by soccer players during training and matches, encompassing variables such as total distance covered, high-intensity running, sprints, accelerations, and decelerations. These metrics are quantified through GPS-derived outcomes, which provide detailed data on speed thresholds, sprint distances, changes of direction, and overall player load. By using GPS technology, coaches and practitioners can monitor movement patterns, optimize training, manage fatigue, and enhance performance while reducing the risk of injury.

Condition being studied Playing positionPhysical demands/workload analysis considering playing position and age of young soccer players using GPS technology or camera analysis.

METHODS

Search strategy Keywords and synonyms were entered in various combinations in the title, abstract or keywords: (soccer OR football*) AND (gps OR "global positioning system" OR locomotor OR demand* OR mechanic* OR performance* OR physical OR run* OR acceleration* OR desacceleration* OR sprint* OR load) AND (young* OR youth OR adolescent OR junior) AND (formation* OR position*).

Participant or population Young soccer under 18 male players, with normal vision, no partial/chronic injury or illness and no history of neuro-psychological impairment.

Intervention Match or trainings external load outcomes.

Comparator Playing position.

Study designs to be included Descriptive studies with playing position comparison/ no study design limitations.

Eligibility criteria Inclusion criteria: (1) Under 18 male soccer players with no injury or illness, with normal vision, no partial/chronic injury or illness and no history of neuropsychological impairment.; (2) Physical demands/workload analysis of players considering playing position using GPS technology/camera analysis. (3) total distance covered, high-intensity running, sprints, accelerations/deccelerations (absolute/relative data). (4) No study design limitation.
(5) Only original and full-text studies.

Information sources Electronic databases (PubMed, Scopus and Web of Science) were searched for relevant publications.

Main outcome(s) Distance covered, high intensity running, sprints, accelerations, and decelerations; speed thresholds, sprint distances and overall player load variables.

Quality assessment / Risk of bias analysis The methodological quality of the studies was assessed following procedures similar to those used in two previous reviews related to sport physical performance and soccer match data collection. All included studies were evaluated based on nine questions (Q1–9), which were slightly adapted from the aforementioned systematic reviews. A three-point scale was employed: “yes” = 2 points, “probably yes” = 1 point, and “no” = 0, except for Q4. Specific guidelines for Q2, Q3, and Q8 . The points for each study were summed, resulting in a total score ranging from 0 to 18. These scores were then converted into percentages, ranging from 0% to 100%. Studies were considered to have adequate methodological quality if they scored above 75%. It is important to note that this assessment was not used as an inclusion or exclusion criterion but rather as an overall measure of methodological rigor.The quality assessment standard for a cross-over study was used. This tool assesses nine items: (i) appropriate cross- over design; (ii) randomized treatment order; (iii) carry-over effect; (iv) unbiased data; (v) allocation concealment; (vi) blinding; (vii) incomplete outcome data; (viii) selective outcome reporting; and (ix) other bias.

Strategy of data synthesis The data will be analyzed by selecting studies involving male soccer players under 18 years old who are injury-free, illness-free, have normal vision, and no history of neuropsychological impairments. The analysis will focus on the physical demands and workload based on playing position, utilizing GPS technology or camera analysis. Variables such as total distance covered, high-intensity running, sprints, and accelerations/decelerations (both absolute and relative) will be extracted. Only studies without design limitations and available in full text will be included.

Subgroup analysis Age-group; playing position.

Sensitivity analysis To adjust for publication bias, a sensitivity analysis was conducted using the trim and fill method, with L0 as the default estimator for the number of missing studies.

Language restriction English.

Country(ies) involved Spain, Portugal.

Keywords football; soccer; workload analysis; young soccer players; playing position; physical demands; GPS-derived outcomes.

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