

## Transferability of the Intra- and Inter-Sectoral Coordination between Training and Competition in Football: A systematic review

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### ADMINISTRATIVE INFORMATION

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**Review Stage at time of this submission -** Data extraction.

**Conflicts of interest -** None declared.

**INPLASY registration number:** INPLASY202680046

**Amendments -** This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 11 August 2026 and was last updated on 11 August 2026.

## INTRODUCTION

**Review question / Objective** This systematic review aimed to synthesise the available evidence on intra- and inter-sectorial coordination in football, with particular emphasis on studies integrating tracking-derived physical, physiological, and tactical variables during training tasks, official matches, or both.

**Rationale** Understanding how tactical coordination behaviours developed during training transfer to competitive match play remains a

central challenge in professional football. Recent advances in tracking technologies enable the quantification of intra-sectorial (within defensive, midfield, and attacking lines) and inter-sectorial (between lines and team-level) coordination using spatiotemporal and positional data. Despite this progress, evidence regarding the consistency, representativeness, and transferability of coordination patterns across training and competition contexts remains fragmented.

**Condition being studied** Transferability of the intra- and inter-sectorial coordination between

training and competition in football players using physical, technical and tactical variables.

## METHODS

**Search strategy** The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines and the Population-Intervention-Comparators-Outcomes (PICOS) design were followed to conduct this systematic review (Page et al., 2021). The literature search was based on three databases: PubMed/Medline, Web of Science (WoS, including all Web of Science Core Collection: Citation Indexes), and SportDiscus. The eligibility criteria were conducted using PICOS approach and it was defined the following search strategy the search-term blocks used to build the Boolean string and screening strategy. Search terms are grouped by population (football), context (training tasks and/or matches), coordination constructs (intra-/inter-sectorial and team coordination), technology (tracking/positional data and EPTS), and integrated outcomes (tracking data, KPI, RPE and wellness). The literature search was accessed during September and December 2025. The search strategy was independently conducted by one review author and checked by a second author. Discrepancies between the authors in the study selection were solved with support a third reviewer. The review protocol followed PRISMA and PICOS guidelines and was registered on the International Platform of Registered Systematic Review and Meta-Analysis Protocols. Searches were conducted in PubMed/Medline, Web of Science Core Collection, and SportDiscus up to December 2024. Methodological quality was assessed using the modified Downs and Black Quality Index and the PEDro scale.

**Participant or population** Football (soccer) players.

**Intervention** Integration of physical, physiological and tactical measures using spatiotemporal datasets.

**Comparator** Physical, physiological and tactical variables using tracking, positional and time-series data based on GPS device.

**Study designs to be included** Observational, cohort, cross-sectional studies and RCTs.

**Eligibility criteria** The studies included in the present systematic review met the following inclusion criteria: i) original research articles focused on adult male football players; ii) studies that applied screening procedures integrating

physical, physiological, and tactical measures using tracking and positional data; iii) studies that used spatiotemporal data to assess physical and physiological performance; iv) studies that used positional and tracking data to quantify spatiotemporal and tactical variables through time-series analysis; v) studies integrating additional performance-related factors (e.g., psychophysiological, technical, or contextual variables) were included only when both target variables of interest (physical/physiological and tactical measures) were simultaneously assessed; vi) studies conducted within the scope of Sport Sciences and focused on human physical and physiological performance; vii) original articles published in peer-reviewed journals, with full text available in English; viii) studies that clearly reported sample characteristics and screening procedures, including data collection methods, study design, instruments, and outcome measures. The exclusion criteria were: i) studies involving individual sports or team sports other than association football, including football codes (e.g., Australian Football, Gaelic Football, Rugby Union, and Rugby Sevens); ii) studies analysing none or only one of the target performance factors (i.e., physical/physiological or tactical measures); iii) studies integrating multiple performance factors but not combining both target variables of interest, even when one of them was included; iv) studies assessing physical and physiological performance using field-based tests or laboratory protocols, rather than tracking and positional data; v) studies assessing tactical variables exclusively through notational analysis or other non-time-series-based methodologies that did not include spatiotemporal positional data; vi) other validated EPTS tracking technologies with explicit spatiotemporal outputs such as video tracking LPS, or optical systems football (e.g., Prozone® or TRACAB®); vii) studies conducted in other research areas or involving non-human participants; viii) articles with poor methodological quality in the description of sample characteristics and screening procedures, according to the PEDro scale criteria; iv) reviews, conference abstracts or proceedings, surveys, opinion pieces, commentaries, books, periodicals, editorials, case studies, non-peer-reviewed texts, and master's or doctoral theses.

**Information sources** The literature search was limited to peer-reviewed original articles published online up to December 2025. Duplicate records were identified and removed prior to the screening process. Titles and abstracts were initially screened according to the eligibility criteria, followed by full-text assessment to determine final inclusion or exclusion. Disagreements were

resolved through discussion between two authors or, when necessary, by consultation with a third researcher. In addition, secondary-sourced articles deemed relevant and meeting identical screening procedures were included.

**Main outcome(s)** The main outcomes will be organized into three main dimensions: tactical behavior based on positional data, physical demands (external load), and physical demands (internal load). Within tactical behavior, variables are further classified according to team-level and individual-level analyses. At the team level, tactical measures include inter-line distance (defensive–midfield and midfield–attacking units), team shape and dispersion (length, width, length-per-width ratio, surface area, and effective playing space), stretch indices at team and sector levels, within-line structure (line width and compactness), and coordination or synchronization metrics. These variables are quantified using measurements such as centroid distances, convex hull–based surface area, maximum–minimum positional ranges, and relative phase analysis derived from Hilbert transform procedures.

**Data management** The outcome measures and the statistical procedures used in the included references were inconsistent between studies, making it impossible to grouped data and perform the meta-analysis. Characterization of participants is reported as mean  $\pm$  standard deviation, confidence interval (IC) and effect size (ES) wherever possible.

**Quality assessment / Risk of bias analysis** The methodological quality was assessed using the modified Downs and Black Quality Index (cross-sectional studies) and the Physiotherapy Evidence Database (PEDro) scale (intervention studies) based on recommendations reported by (Rago et al., 2020). Quality Assessment was independently performed by two authors with subsequent inter-observer reliability analysis (Kappa index: 0.91; 95% IC: 0.90–0.92).

**Strategy of data synthesis** Data extraction was organised into: (i) sampling and study characteristics; (ii) intra-sectorial vs inter-sectorial outputs, (iii) tracking technology and sampling frequency; (iv) methodological procedures and analysis and (v) integration with GPS-derived load, KPI, RPE and wellness indicators (4).

**Subgroup analysis** Three subgroup analysis: tactical behavior based on positional data, physical demands (external load and KPI), and physical demands (internal load). Within tactical behavior,

variables are further classified according to team-level and individual-level analyses.

**Sensitivity analysis** Quality Assessment was independently performed by two authors with subsequent inter-observer reliability analysis (Kappa index: 0.91; 95% IC:0.90–0.92).

**Language restriction** Quality Assessment was independently performed by two authors with subsequent inter-observer reliability analysis (Kappa index: 0.91; 95% IC:0.90–0.92).

**Country(ies) involved** Portugal.

**Keywords** Tactical behaviour; complex systems; training load; performance analysis; soccer.

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