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INPLASY

Momentum in Invasion Sports: A Comprehensive Review and Conceptual Framework for Competitive Dynamics

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Kewley, J; Gupta, R; Keller, B; Moffatt, SJ; Chapman, D.

Corresponding author:
Jackson Kewley

jackson.kewley@curtin.edu.au

Author Affiliation:
Curtin University.

ADMINISTRATIVE INFORMATION

Support - Fremantle Football Club.

Review stage at the time of initial registration - Data analysis.

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 16 November 2026 and was last updated on 16 November 2026.

INTRODUCTION

Review question / Objective How have momentum and related changes in competitive advantage been defined, explained and measured in sport performance, and what do these approaches reveal about how competitive dynamics are commonly measured in invasion sports?

The population comprises athletes and teams studied in sporting or athletic-performance settings. The concept is momentum and related changes in competitive advantage, including dominance, hot-hand effects, success-breeds-success, game-state changes and evolving win probability. The evidence search covers sport broadly, with invasion sports as the focus of the conceptual synthesis and framework application.

The objectives are to map definitions and measures, identify the dimensions of competitive change they capture, and use the synthesis to develop a framework that distinguishes Momentum, a transient change in competitive state associated with goal-directed players and ball movement, from Dominance, a sustained competitive advantage over an opponent. This distinction addresses the circular use of competitive outcomes to infer momentum and then invoking momentum to explain those same outcomes.

Background In sport performance research, momentum is a polysemous term describing phenomena ranging from shifts in confidence, effort and coordination to scoring streaks and sustained territorial control. Researchers examine these phenomena at the individual and team levels, using different measures and observation windows. Researchers examine these phenomena at different levels of analysis, from individual athletes to teams, and researchers study them using different measures and temporal observation windows. In invasion sports, teams can create scoring opportunities through the coordinated movement of players and the ball towards a scoring target. They can also limit an opponent's

opportunities by controlling space and restricting progression. These changes can occur while the score remains unchanged, making match events, player and ball movement, and spatial organisation relevant to studying competitive dynamics.

Rationale The polysemous use of momentum makes it difficult to establish which aspects of competitive change a study measures or to compare findings across sports and research traditions. A recurring ambiguity arises when an outcome such as a scoring run is treated as evidence that momentum had occurred, and the momentum inferred from that run is then used to predict subsequent scoring runs. A scoping review can map how empirical studies define, explain and measure related constructs across diverse designs and settings. The synthesis informs the development of Game State Flux, a framework for examining how goal-directed player and ball movement produces short-term shifts in competitive state and how sustained advantages emerge through movement and other aspects of play.

METHODS

Strategy of data synthesis PubMed and SPORTDiscus were searched on 6 July 2026. Both searches combined terms for momentum and related competitive dynamics with terms for sport performance and match analysis.

PubMed. ("momentum"[tiab] OR "match momentum"[tiab] OR "game momentum"[tiab] OR "within-match momentum"[tiab] OR "performance runs"[tiab] OR "performance streak*"[tiab] OR "hot hand"[tiab] OR "success breeds success"[tiab] OR "game state"[tiab] OR "match state"[tiab] OR "score differential"[tiab] OR "win probability"[tiab] OR dominance[tiab]) AND ("performance analysis"[tiab] OR "match analysis"[tiab] OR "game analysis"[tiab] OR "notational analysis"[tiab] OR "sports performance"[tiab] OR "Athletic Performance"[Mesh]).

SPORTSDiscus (EBSCOhost). (TI ("momentum" OR "match momentum" OR "game momentum" OR "within-match momentum" OR "performance runs" OR "performance streak*" OR "hot hand" OR "success breeds success" OR "game state" OR "match state" OR "score differential" OR "win probability" OR dominance)) AND (TI ("performance analysis" OR "match analysis" OR "game analysis" OR "notational analysis" OR "sports performance" OR "athletic performance") OR AB ("performance analysis" OR "match analysis" OR "game analysis" OR "notational analysis" OR "sports performance" OR "athletic performance")).

The search was intentionally broad to capture variation in terminology and conceptual approaches across sports. Only English-language evidence was eligible.

The review uses descriptive mapping and narrative synthesis. Study definitions, explanations, and measures are compared to derive conceptual dimensions inductively. A study can contribute to multiple dimensions. Frequencies and co-occurrences describe the coverage of each dimension, and narrative comparison examines how the dimensions relate to different research approaches.

Eligibility criteria Population: Athletes and teams investigated in sporting or athletic performance settings.

Concept: Momentum or a closely related change in competitive change, including dominance, hot-hand effects, success-breeds-success, game-state changes, and evolving win probability. Eligible studies had to investigate the construct in relation to sporting performance.

Context: The search covered sport broadly. The invasion sport domain was the focus for the subsequent conceptual framework construction and application.

Sources of evidence: English-language studies reporting original empirical data from observational, experimental, analytical or other empirical designs capable of examining the phenomenon were eligible. Non-sporting applications, studies unrelated to sporting performance or competitive dynamics, reviews, theoretical, or commentary papers, conference abstracts, editorials, book chapters and other non-original research outputs were excluded.

Source of evidence screening and selection Jackson Kewley screened the records across all three stages. Titles were screened for relevance to sport and sporting performance and for clearly ineligible publication types. Abstracts were assessed for coverage of momentum or a related change in competitive advantage, relevance to

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sporting performance, and evidence of empirical investigation. Full texts were assessed against the eligibility criteria, including whether they reported original empirical data and used a design capable of examining the construct.

The searches identified 2,327 records before deduplication. After removing duplicates and screening titles, 793 records remained for abstract screening. Of these, 40 progressed to full-text assessment, and 26 met the inclusion criteria. Six full texts were excluded because they did not report original empirical research, and eight were excluded because they used an ineligible study design.

Data management Jackson Kewley recorded all study information in a spreadsheet and summarised it in an evidence table. For each included study, the table records the citation, the sport(s) examined, the competitive control construct investigated, and the key findings. Study definitions, explanations, and measured or observed variables informed the assignment of the conceptual dimensions. A study could be assigned to multiple dimensions where each played a substantive role.

Reporting results / Analysis of the evidence The analysis maps how empirical studies define, explain and operationalise momentum and related constructs. Dimensions were derived inductively from the substantive role of each construct and measure in the included studies. Descriptive counts summarise the frequency and co-occurrence of psychological, behavioural, physiological, performance and spatial dimensions. The spatial dimension encompasses territorial control, progression through space and player organisation. A narrative synthesis compares the research traditions and informs the Game State Flux framework.

Presentation of the results A flow diagram presents record identification, title and abstract screening, full-text assessment, exclusions and final inclusion. A study-level evidence table summarises each included source by citation, sport, competitive construct and key findings. A matrix displays the frequency and co-occurrence of the conceptual dimensions.

An illustrative application using selected passages from the 2025–2026 National Basketball League (NBL) season shows how time from possession initiation to a shot attempt can serve as a proxy for goal-directed progression, and how the balance of favourable and unfavourable events can represent relative competitive advantage.

Language restriction English.

Country(ies) involved Australia.

Other relevant information The literature search, screening and study selection were completed before preparing this registration. The basketball proof of concept illustrates how the Game State Flux framework can be operationalised in match play.

Keywords Momentum; Dominance; Competitive Dynamics; Performance Analysis; Sports Analytics; Invasion Sports; Player Movement.

Dissemination plans The review and the Game State Flux framework are being prepared for dissemination in a scholarly manuscript, alongside an illustrative application in NBL match play.

Contributions of each author

Author 1 - Jackson Kewley - Jackson Kewley conducted the literature review, drafted the manuscript and revised it in response to feedback from his supervisors.
Email: jackson.kewley@student.curtin.edu.au
Author 2 - Ritu Gupta - Ritu Gupta provided research supervision and data science expertise, contributed to the literature search strategy and the development of the Game State Flux framework, and reviewed and edited the manuscript.
Email: r.gupta@curtin.edu.au
Author 3 - Brad Keller - Brad Keller contributed to the development of the Game State Flux framework for understanding competitive dynamics, drawing on applied sport expertise from the Fremantle Football Club.
Email: brad.keller@fremantlefc.com.au
Author 4 - Samuel Moffatt - Sameul Mofatt's foundational work at the Fremantle Football Club motivated the development of Game State Flux. The author drew on applied sport expertise to help develop the framework for developing competitive dynamics in invasion sports.
Email: sam.moffatt@fremantlefc.com.au
Author 5 - Dale Chapman - Dale Chapman supervised the research, contributed to the literaure search strategy and the development of the Game State Flux framework, and applied subject matter expertise in reviewing and editing the manuscript.
Email: dale.chapman@curtin.edu.au

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