



Fundamental Movement Skills Research from 2000 to 2025: A Bibliometric Analysis with Pedagogical Interpretation

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Abstract

Background. Fundamental Movement Skills (FMS) are widely recognized as a foundation for physical activity, motor development, and sport participation. However, within educational contexts, FMS also represent a core learning domain shaped by instructional design, pedagogical strategies, and learning processes. Despite a rapidly expanding body of research, FMS scholarship remains conceptually fragmented across health, sport science, and educational traditions, limiting the development of coherent, learning-oriented frameworks.

Objectives. The purpose of this study was to examine the conceptual structure, thematic evolution, and contemporary research fronts of FMS research through a bibliometric analysis, with a specific focus on pedagogical and learning-oriented interpretation.

Materials and Methods. A bibliometric analysis was conducted using 1,281 Scopus-indexed publications published between 2000 and 2025. Authors' keywords served as the primary unit of analysis. Keyword co-occurrence networks, thematic evolution analysis, and clustering of contemporary research fronts were performed using the bibliometric package in R. Network normalization was based on association strength, and community detection was conducted using the Louvain algorithm.

Results. The analysis revealed a four-cluster conceptual structure encompassing assessment and motor development, health-related outcomes, pedagogical interventions, and performance-oriented perspectives. Thematic evolution analysis demonstrated a shift from outcome-focused themes (e.g., balance, physical activity, overweight) toward competence-based constructs such as motor competence and object control skills in recent years. Three major contemporary research fronts were identified: physical education and training, motor performance, and a peripheral biomedical domain. Mapping these fronts onto six pedagogically relevant roles of FMS highlighted strong alignment with instructional and performance-based frameworks, alongside limited integration of cognitive and professional-functional dimensions.

Conclusions. The findings indicate that FMS research has evolved toward integrative, competence-based, and pedagogically actionable models of movement learning. At the same time, bibliometric patterns reveal underexplored opportunities for integrating cognitive mechanisms and functional applications beyond traditional physical education contexts. This study provides a structured, evidence-based foundation for advancing pedagogically grounded approaches to FMS instruction and future research.

Keywords: fundamental movement skills, motor competence, physical education, movement learning, pedagogical intervention, bibliometric analysis, thematic evolution, research fronts.

Introduction

Fundamental Movement Skills (FMS) are widely recognized as a foundational component of human movement and physical development (Robinson et al., 2015; Stodden et al., 2008). Traditionally, FMS have been understood as basic movement patterns – such as running, jumping, throwing, or catching – that underpin participation in physical activity

and sport (Lubans et al., 2010; Zuvela et al., 2011; Barnett et al., 2008; Holfelder et al., 2014). However, within educational and learning-oriented contexts, FMS represent more than a set of motor actions; they constitute a core learning domain through which individuals acquire, refine, and transfer movement capabilities across diverse tasks and environments. From this perspective, FMS are inseparable from processes of teaching, learning, and instructional design, making them a central concern for educational research and practice (Logan et al., 2012; Morgan et al 2013; Wick et al., 2017).

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In school-based physical education and early childhood education, FMS function as learnable competencies that shape children's capacity to engage in structured learning activities, adapt to new motor challenges, and progress toward more complex forms of movement (Morgan et al., 2013; Wick et al., 2017; Veldman et al., 2016; Koolwijk et al., 2024). Increasingly, educational researchers emphasize not only what learners can perform at a given moment, but how movement skills are learned, stabilized, and transferred over time (Stodden et al., 2008; Robinson et al., 2015). This shift aligns FMS research with broader learning theories and positions FMS as a bridge between motor development, pedagogy, and instructional methodology (Bardid et al., 2019; Mulvey et al., 2018; van der Fels et al., 2015).

Despite their pedagogical relevance, FMS research remains conceptually fragmented. Studies addressing Fundamental Movement Skills are distributed across multiple disciplinary domains, including physical education, sport sciences, public health, and developmental psychology. As a result, the literature is characterized by heterogeneous terminology, diverse outcome measures, and varying theoretical assumptions (Barnett et al., 2016). Health-oriented studies frequently emphasize associations between FMS and physical activity levels or obesity-related outcomes (Lubans et al., 2010), whereas sport science research tends to focus on motor performance, skill proficiency, and competence-related constructs. Pedagogically oriented investigations, in turn, primarily concentrate on instructional interventions and curriculum design within physical education contexts (Morgan et al., 2013). This disciplinary dispersion complicates efforts to synthesize knowledge across domains and limits the development of coherent, learning-oriented frameworks for FMS instruction. Previous pedagogically oriented analyses have highlighted the need to interpret FMS not only as motor outcomes but as learning-related constructs embedded within instructional processes (Khudolii et al., 2025).

Over the past two decades, the focus of FMS research has gradually evolved. Early studies frequently treated FMS as outcome variables linked to balance, physical activity levels, or health-related indicators (Lubans et al., 2010). More recent research reflects a shift toward process-oriented and competence-based perspectives, emphasizing constructs such as motor competence, movement quality, and object control skills (Barnett et al., 2016). These developments signal a conceptual transition from static descriptions of motor ability toward dynamic models of skill acquisition and learning progression, aligning FMS research with broader pedagogical concerns regarding the development of transferable competencies rather than isolated skills (Stodden et al., 2008).

Given the expanding volume and increasing diversity of FMS-related publications, bibliometric approaches offer a valuable means of systematically examining the structure and evolution of the field (Aria & Cuccurullo, 2017). Unlike narrative reviews, which are often constrained by disciplinary boundaries or selective inclusion criteria, bibliometric analysis enables the identification of large-scale patterns, thematic clusters, and emerging research fronts based on objective publication data (Donthu et al., 2021; van Eck & Waltman, 2010). Such analyses are particularly useful for clarifying how different research traditions intersect and how conceptual

emphases shift over time, thereby providing learning- and methodology-oriented journals with evidence to support the development of coherent pedagogical models grounded in the actual structure of the research landscape.

However, existing bibliometric studies on Fundamental Movement Skills have predominantly emphasized health-related outcomes or sport performance, with comparatively limited attention to learning-oriented synthesis. As a result, comprehensive analyses that explicitly interpret the evolution of FMS research through pedagogical perspectives remain scarce. In particular, there is a need for integrative approaches that connect conceptual trends in the literature with teaching practices, instructional design, and learning processes, in order to better align FMS research with educational and methodological frameworks.

Therefore, the purpose of this study was to provide a comprehensive bibliometric analysis of FMS research indexed in Scopus from 2000 to 2025, with a specific focus on learning, pedagogy, and methodological implications. The analysis aimed to address the following research questions:

(1) What is the conceptual structure of FMS research during the analyzed period? (2) How have the major research themes evolved over time? (3) What contemporary research fronts characterize recent FMS scholarship, and how can they be interpreted from a pedagogical perspective?

By answering these questions, the study seeks to clarify the intellectual organization of FMS research and to support the development of pedagogically grounded, evidence-based approaches to movement learning and instruction.

Materials and Methods

Data Source and Search Strategy

A bibliometric analysis was conducted using the Scopus database, selected due to its broad coverage of peer-reviewed journals in education, sport sciences, and health-related disciplines. The search was performed on 1 December 2025. Publications were retrieved using a topic-based search applied to titles, abstracts, and authors' keywords with the following query:

TITLE-ABS-KEY ("fundamental movement skills" OR "motor competence" OR "motor skill competence")

The search was restricted to journal articles and review papers published in English between 2000 and 2025. No subject-area filters were applied at the search stage in order to capture the interdisciplinary nature of FMS research. After removing duplicates and records lacking bibliographic completeness, the final dataset comprised 1,281 documents, which constituted the core corpus for analysis.

Data Preprocessing

Bibliographic records were exported from Scopus in BibTeX format and processed in R. Authors' keywords were selected as the primary unit of analysis, as they most directly reflect the conceptual framing adopted by researchers. To reduce noise and improve conceptual coherence, keyword preprocessing included standardization of spelling variants, unification of singular and plural forms, and merging of closely related terms using a harmonized keyword field. Re-

cords with missing or non-informative keyword entries were excluded from keyword-based analyses.

Bibliometric Analysis

All analyses were performed in R (version 4.5.2; R GUI 1.82, High Sierra build) using the bibliometrix package (version 5.2.1) within RStudio (version 2025.09.2+418). Descriptive bibliometric indicators were first calculated to characterize the publication output, sources, and authorship patterns within the corpus.

Conceptual structure was examined through keyword co-occurrence analysis, using authors' keywords. Co-occurrence networks were normalized using association strength, and community detection was performed with the Louvain algorithm. A minimum occurrence threshold of 10 was applied to keywords in order to balance thematic coverage and network interpretability. Isolated nodes were removed, and a minimum edge threshold of 10 was used consistently across network analyses.

Thematic Evolution and Research Fronts

To examine temporal dynamics, thematic evolution analysis was conducted by dividing the study period into consecutive time slices, allowing identification of emerging, declining, and transforming themes over time. Thematic clusters were interpreted based on their internal cohesion and external connectivity.

Contemporary research fronts were identified through clustering of the most recent subset of publications, reflecting dominant and active lines of inquiry at the end of the observation period. These fronts were interpreted at the conceptual level rather than as disciplinary categories, enabling synthesis across educational, performance-oriented, and health-related research traditions.

Interpretative Framework

Bibliometric findings were interpreted through a pedagogical lens by mapping identified themes and research fronts onto six analytically defined roles of Fundamental Movement Skills:

- (1) FMS as a component of development;
- (2) FMS as a developmental marker;
- (3) FMS as a foundation for sport specialization;
- (4) FMS as a basis for professional and functional activity;
- (5) FMS and cognitive development as an integrated construct;
- (6) FMS within the pedagogical process.

These methodological choices were made to ensure the interpretability of results for pedagogical and learning-oriented synthesis.

Results

Conceptual structure of FMS research

The keyword co-occurrence analysis revealed a four-cluster conceptual structure within the FMS literature. These clusters represent major thematic domains related to assessment and measurement, motor development, health-related outcomes, and pedagogical interventions. The structure indicates that FMS research is not monolithic but organized around complementary methodological and applied perspectives (Figure 1).

Thematic evolution of FMS research

Thematic evolution analysis demonstrated clear continuity across the three examined periods, as indicated by directional links between themes. In the most recent period

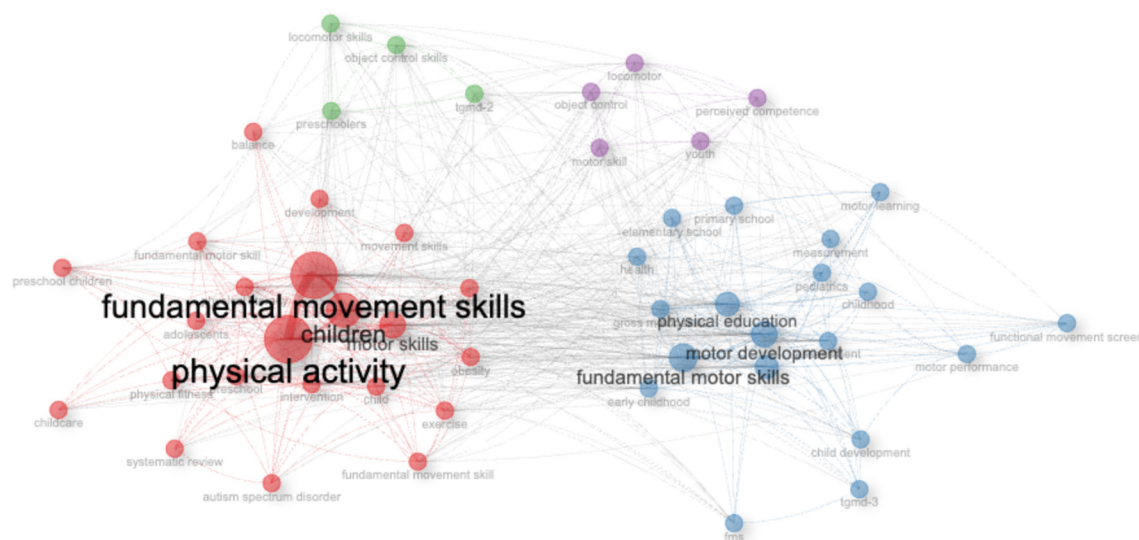


Fig. 1. Keyword co-occurrence network of core Fundamental Movement Skills (FMS) research (Scopus, 2000–2025)

Table 1. Overview of the three major research fronts in the Scopus-based core corpus (2000–2025)

Research front	What the cluster typically captures	Dominant outcomes/constructs	Why it matters (pedagogical reading)
1. Physical education and training	School- and community-based PE interventions; teaching/learning designs; active play and structured programs targeting FMS	FMS proficiency, PA engagement, skill acquisition effects, implementation features	Directly actionable evidence for instructional design, teacher training, and curriculum decisions (Morgan, et al., 2013; Veldman, et al., 2016; Wick et al., 2017; Zhang et al., 2025).
2. Human tissue	Health- and biology-adjacent framing of FMS: adiposity/weight status, fitness, risk correlates, physiological/health implications	CRF/fitness, BMI/adiposity, health-risk markers; “FMS as health indicator” logic	Positions FMS as screening/diagnostic marker within pedagogy (who needs what, and why) (Hardy et al., 2012; Williams et al., 2008; Lubans et al., 2010).
3. Motor performance	Motor competence/performance constructs: coordination, object control, locomotor patterns; developmental pathways; links to PA and cognition	Motor competence, perceived competence, PA/fitness trajectories, motor–cognition links	Bridges pedagogy with performance progression and developmental mechanisms (Stodden et al., 2008; Barnett et al., 2008; van der Fels et al., 2015).

Table 2. Mapping: research fronts → six roles of FMS → pedagogical actions

FMS role (your framework)	Best-matching front(s)	What the bibliometric pattern implies	Pedagogical action
FMS as a component of development	1, 3	FMS is treated as a “core developmental outcome” and as a performance construct	Define grade/age-specific skill benchmarks, then align lesson objectives and assessment to these benchmarks (Stodden et al., 2008; Morgan et al., 2013).
FMS as a developmental marker	2, 3	FMS is used to stratify risk/opportunity (fitness/PA/health pathways)	Introduce screening + targeted supports (tiered instruction) rather than uniform programming (Hardy et al., 2012; Lubans et al., 2010).
FMS as a foundation for sport specialization	3 (and 1)	Object control/locomotion clusters connect to later sport engagement and performance logic	Build a “FMS-to-sport skill bridge” module (object control as the hinge), with explicit transfer tasks (Barnett et al., 2008; Williams et al., 2008).
FMS as a basis for professional/functional activity	2 (and 3)	“Functional capacity” is often mediated via fitness/PA and movement competence	Include functional movement literacy outcomes (posture, balance/stability, safe load handling) inside PE learning outcomes (van der Fels et al., 2015; Lubans et al., 2010).
FMS and cognitive development as an integrated construct	3	Motor–cognition coupling is visible as a distinct evidence line	Use dual-demand tasks (decision-making + movement execution) and track both motor and executive outcomes (van der Fels et al., 2015).
FMS within the pedagogical process	1	Interventions cluster around delivery quality (specialists/trained teachers, dosage, design)	Specify dose–response parameters (frequency, duration, feedback mode) and fidelity checks in the Methods section (Morgan et al., 2013; Veldman et al., 2016; Wick et al., 2017).

De Meester et al., 2016; Zhang et al., 2025; Mulvey et al., 2018);

- Human tissue, representing a peripheral biomedical front linking movement outcomes with physiological or tissue-level considerations (Cattuzzo et al., 2016; Lima et al., 2019; Utesch et al., 2019);
- Motor performance, constituting a core front that conceptualizes FMS as a foundation for efficient and effective movement execution (Robinson et al., 2015; Lopes et al., 2011; Lima et al., 2017; De Meester et al., 2016).

Together, these fronts indicate that contemporary FMS research is concentrated around pedagogical application and performance-oriented frameworks, with selective interdisciplinary extensions (Table 1, 2).

The descriptive characteristics of the bibliometric corpus and a structured overview of the main analytical outcomes are presented in Tables 3 and 4.

Author-level characteristics of the FMS research corpus

Table 5 summarizes the most influential authors in Fundamental Movement Skills research based on publication

Table 3. Descriptive characteristics of the FMS bibliometric corpus (Scopus, 2000–2025)

Indicator	Description
Data source	Scopus
Time span	2000–2025
Total number of documents	1,281
Document types	Research articles and review papers
Language of publications	Predominantly English
Main research domains	Physical education, sport sciences, motor development, health-related studies
Unit of analysis	Authors’ keywords
Keyword preprocessing	Harmonization and merging of keyword variants; exclusion of automatically generated keywords
Bibliometric software	bibliometrix package (R)
Main analytical techniques	Keyword co-occurrence analysis; thematic evolution analysis; clustering of contemporary research fronts
Normalization method	Association strength
Clustering algorithm	Louvain community detection
Visualization approach	Network-based graphical representation

Table 4. Overview of conceptual clusters, thematic evolution, and contemporary research fronts in FMS research

Analytical level	Cluster / Theme	Representative keywords	Related figure
Conceptual structure	Assessment and motor development	assessment, motor skills, motor development, fundamental movement skills	Figure 1
Conceptual structure	Health-related outcomes	health, obesity, physical activity, fitness	Figure 1
Conceptual structure	Pedagogical interventions	physical education, teaching, training, intervention	Figure 1
Conceptual structure	Performance-oriented perspectives	motor performance, competence, skill acquisition	Figure 1
Thematic evolution (2017–2025)	Emerging themes	motor competence, object control skills	Figure 2
Thematic evolution (2017–2025)	Declining themes	balance, overweight, physical activity	Figure 2
Contemporary research fronts	Physical education and training	instruction, curriculum, training programs, intervention design	Figure 3
Contemporary research fronts	Motor performance	motor competence, movement quality, performance	Figure 3
Contemporary research fronts	Peripheral biomedical domain	human tissue, physiological characteristics	Figure 3

Table 5. Most influential authors in Fundamental Movement Skills research and their citation impact (Scopus, 2000–2025)

Author	Primary research focus	Main thematic cluster (Fig. 1)	NP	TC	h-index (within corpus)
Barnett, L.M.	Motor competence, FMS assessment, physical activity	Assessment & motor development	79	7,243	38
Morgan, P.J.	Physical education interventions, motor competence	Pedagogical interventions	34	5,607	26
Okely, A.D.	Health-related outcomes (body composition / overweight–obesity correlates) in relation to Fundamental Movement Skills across childhood and adolescence	Health-related outcomes	33	5,006	23
Lubans, D.R.	School-based physical education interventions	Pedagogical interventions	28	4,145	20
Hardy, L.L.	Physical activity, FMS, health indicators	Health-related outcomes	19	2,059	15
Robinson, L.E.	Motor skill learning, early childhood education	Pedagogical interventions	26	1,882	17
Stodden, D.F.	Developmental model of motor competence	Performance-oriented perspectives	27	1,751	13

Notes. NP = number of publications within the analyzed corpus; TC = total citations received by these publications; h-index calculated within the FMS corpus. Authors are ranked by total citations (TC). Thematic clusters correspond to those identified in Figure 1.

output and citation impact within the analyzed Scopus corpus. The table presents each author’s number of publications (NP), total citations (TC), and h-index calculated within the corpus, together with their primary research focus and alignment with the major thematic clusters identified in Figure 1.

The results indicate that a relatively small group of authors accounts for a substantial proportion of highly cited FMS publications, with contributions spanning assessment and motor development, pedagogical interventions, health-related outcomes, and performance-oriented perspectives. This distribution reflects the multidisciplinary character of FMS research and provides an author-level complement to the conceptual and thematic structures illustrated in Figures 1–3.

Discussion

Interpreting these bibliometric patterns through a pedagogical lens allows the identified research fronts to be aligned with established and emerging roles of FMS in learning and development.

Compared with previous narrative and systematic reviews, which predominantly examined associations between FMS and health-related or physical activity outcomes (Lubans et al., 2010; Robinson et al., 2015), the present bibliometric analysis provides a structural perspective on how these research strands are organized, connected, and transformed over time. While earlier models have conceptualized FMS primarily within developmental or health trajectories (Stodden et al., 2008), the bibliometric patterns identified here reveal a broader reorientation toward competence-based and pedagogically actionable constructs. This shift becomes visible only when the literature is examined at scale, across disciplines and time periods.

FMS as a Component of Development

Across the corpus, FMS are consistently embedded within developmental frameworks, particularly in early childhood research. The prominence of development-oriented clusters in Figure 1 and their continuity in Figure 2 confirm

that FMS are widely conceptualized as an integral component of motor development rather than isolated motor behaviors.

FMS as a Developmental Marker

Earlier research frequently examined FMS in relation to balance, physical activity, and overweight as outcome variables. The disappearance of these topics as independent themes in the 2017–2025 period suggests a shift away from simple correlational models toward more complex explanatory frameworks, in which FMS function as indirect or mediating developmental markers.

FMS as a Foundation for Sport Specialization

The emergence of object control skills and motor performance highlights growing attention to the structural components of FMS that underpin later sport-specific skills. This aligns with performance-oriented research fronts (Figure 3) and supports the interpretation of FMS as a foundational platform for sport specialization.

FMS as a Basis for Professional and Functional Activity

Despite their recognized importance, FMS remain largely absent from discussions of professional or occupational performance. The lack of a corresponding research front across Figures 1–3 identifies a clear research gap and an opportunity for future studies linking FMS to functional competence beyond sport and education contexts.

FMS and Cognitive Development as an Integrated Construct

Cognitive and executive-function-related themes remain peripheral in the bibliometric structure. Although emerging interdisciplinary studies exist, the limited visibility of cognition-related constructs suggests that integration between motor and cognitive development in FMS research is still underdeveloped.

FMS within the Pedagogical Process

The physical education and training front identified in Figure 3 confirms that pedagogy remains a central application domain for FMS research. However, the methodological diversity of intervention designs and outcome measures indicates a need for greater conceptual and methodological standardization within pedagogical frameworks.

Overall Implications

Taken together, the bibliometric evidence suggests that research on Fundamental Movement Skills has evolved from predominantly descriptive and outcome-focused approaches toward more integrative, competence-based, and performance-oriented models. While pedagogical applications are well represented, the cognitive and professional-functional dimensions of FMS remain comparatively underexplored, yet offer promising directions for future research within learning-oriented and interdisciplinary contexts.

Pedagogical Implications

The findings of this bibliometric analysis have several important implications for the design, implementation, and evaluation of teaching and learning processes related to Fundamental Movement Skills (FMS).

First, the consolidation of motor competence as a central construct suggests that pedagogical approaches should move beyond fragmented training of isolated motor elements toward integrated learning models. In educational practice, this implies structuring curricula around progressive development of motor competence, where FMS are taught as interconnected and transferable movement capabilities rather than as discrete skills assessed in isolation.

Second, the growing prominence of object control skills highlights their pedagogical value as a focal point for instructional sequencing. Object control skills are particularly responsive to deliberate practice, feedback, and task constraints, making them suitable targets for instructionally guided learning in physical education and youth sport. Teachers and instructors can leverage these skills as pedagogical anchors for linking fundamental movements with game-based learning, sport initiation, and problem-solving tasks.

Third, the strong presence of the physical education and training research front underscores the importance of intentional instructional design in FMS development. Pedagogical interventions should prioritize:

- clear learning objectives aligned with motor competence outcomes,
- task progressions that reflect developmental readiness,
- formative assessment strategies that capture qualitative aspects of movement performance.

Such approaches reinforce the role of the teacher not merely as a facilitator of activity, but as a designer of learning environments that systematically support skill acquisition and refinement.

Fourth, the reduced emphasis on outcome indicators such as balance or physical activity levels as standalone pedagogical goals indicates a need to reconsider assessment practices. Rather than treating these indicators as direct instructional targets, educators should view them as emergent outcomes of well-structured FMS learning processes. This perspective supports the use of process-oriented assessment tools that evaluate movement quality, coordination, and adaptability.

Finally, the limited integration of cognitive dimensions within FMS research points to a significant pedagogical opportunity. Embedding cognitive challenges – such as decision-making, attention control, and task variability – into FMS instruction may enhance learning transfer and support holistic development. From a pedagogical standpoint, this calls for closer alignment between motor learning principles and educational psychology in the design of FMS curricula.

Overall, the results highlight that effective pedagogy in Fundamental Movement Skills relies on intentional teaching, structured progression, and conceptually grounded assessment. These implications underscore the importance of FMS research as a basis for developing evidence-based teaching strategies that integrate movement learning with broader educational objectives (Table 6).

Table 6. Translating bibliometric research findings on Fundamental Movement Skills into pedagogical actions

Research finding (from bibliometric fronts)	Pedagogical action (what a teacher/curriculum designer does next)
School/community interventions consistently improve ≥ 1 FMS when instruction is developmentally appropriate and delivered by trained staff (Morgan et al., 2013).	Specify teacher preparation, fidelity checks, and progression rules as mandatory elements of PE programming
FMS proficiency is linked to PA/fitness and obesity-prevention logic (Williams et al., 2008; Lubans et al., 2010).	Implement screening + tiered instruction; prioritize locomotor + object control deficits early
Motor competence relates to later activity/fitness and perceived competence pathways (Barnett et al., 2008).	Add motivational/perceived-competence supports (mastery climate, feedback protocols) alongside skill drills
Motor-cognition relationships support integrated motor-executive tasks (van der Fels et al., 2015).	Embed dual-task and decision-making constraints (choice, inhibition, switching) in FMS lesson plans

Conclusion

This bibliometric analysis elucidates the conceptual structure and developmental trajectory of Fundamental Movement Skills (FMS) research within a learning- and teaching-oriented framework. Drawing on Scopus-indexed publications from 2000 to 2025, the study demonstrates that FMS research has evolved from descriptive assessments of motor skills toward pedagogically meaningful, competence-based, and performance-informed models of learning.

The findings highlight the central role of motor competence as an integrative construct that connects FMS with instructional design, learning progression, and movement quality. The consolidation of pedagogical and training-oriented research fronts underscores that FMS are increasingly conceptualized not merely as developmental outcomes, but as learnable and teachable competencies that can be systematically shaped through structured educational interventions.

At the same time, the thematic evolution reveals a pedagogically significant shift away from isolated outcome indicators – such as balance or physical activity levels—toward structural components of movement, including object control skills, which are directly amenable to instructional planning and curricular sequencing. This transition reflects growing methodological maturity in FMS pedagogy, emphasizing how movement skills are acquired, refined, and transferred through learning processes.

Despite these advances, the bibliometric patterns also expose critical pedagogical gaps. Cognitive mechanisms underlying FMS learning, as well as the transfer of FMS to functional and professional activities beyond physical education, remain insufficiently explored. Addressing these gaps requires closer integration of motor learning theory, educational psychology, and instructional methodology within FMS research.

In conclusion, the accumulated evidence positions Fundamental Movement Skills as a foundational pedagogical construct that connects motor development, learning theory, and instructional practice. Future research should therefore prioritize the elucidation of learning mechanisms underlying skill acquisition, the optimization of teaching strategies, and the extension of FMS-based frameworks to diverse educational settings and real-world contexts.

AI Transparency Statement

Artificial intelligence-based tools were used exclusively to support language editing, text refinement, and structur-

al consistency of the manuscript. All conceptual decisions, methodological design, data analysis, interpretation of results, and final conclusions were developed and validated by the authors. The authors take full responsibility for the content of the manuscript.

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Data Availability

Data availability is not applicable to this article as no new data were created or analyzed.

Conflict of Interest

The authors declare no conflicts of interest.

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Дослідження фундаментальних рухових навичок у 2000–2025 роках: бібліометричний аналіз із педагогічною інтерпретацією

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Авторський вклад: А – дизайн дослідження; В – збір даних; С – статаналіз; D – підготовка рукопису; Е – збір коштів

Реферат. Стаття: 9 с., 6 табл., 3 рис., 27 джерел.

Передумови. Фундаментальні рухові навички (Fundamental Movement Skills, FMS) широко визнаються основою фізичної активності, моторного розвитку та участі у спорті. Водночас в освітніх контекстах FMS слід розглядати як ключову навчальну галузь, що формується під впливом навчального дизайну, педагогічних стратегій і процесів навчання. Незважаючи на стрімке зростання кількості досліджень, наукові праці з проблематики FMS залишаються концептуально фрагментованими між галузями охорони здоров'я, спортивної науки та освіти, що ускладнює формування цілісних, навчально орієнтованих теоретичних рамок.

Мета. Метою дослідження було проаналізувати концептуальну структуру, тематичну еволюцію та сучасні дослідницькі fronti наукових праць, присвячених фундаментальним руховим навичкам, на основі бібліометричного аналізу з акцентом на педагогічну та навчально орієнтовану інтерпретацію.

Матеріали і методи. Проведено бібліометричний аналіз 1 281 публікації, проіндексованої в базі даних Scopus у період 2000–2025 років. Основною одиницею аналізу слугували авторські ключові слова. Для аналізу використовували мережі співзвучності ключових слів, аналіз тематичної еволюції та кластеризацію сучасних дослідницьких фронтів із застосуванням пакета *bibliometrix* у середовищі R. Нормалізацію мереж здійснювали за показником сили асоціації, а виявлення спільнот — за допомогою алгоритму Louvain.

Результати. У результаті аналізу виявлено чотирикластерну концептуальну структуру, що охоплює оцінювання і моторний розвиток, здоров'язбережувальні результати, педагогічні інтервенції та орієнтовані на продуктивність підходи. Аналіз тематичної еволюції засвідчив зміщення акценту від результат-орієнтованих тем (зокрема, рівновага, фізична активність, надмірна маса тіла) до компетентнісних конструктів, таких як моторна компетентність і навички володіння предметами, у новітній період. Визначено три основні сучасні дослідницькі fronti: фізичне виховання і тренування, моторна продуктивність та периферійний біомедичний напрям. Проекція цих фронтів на шість педагогічно релевантних ролей FMS виявила їх тісний зв'язок з навчальними та продуктивнісними моделями, водночас засвідчивши обмежену інтеграцію когнітивних і професійно-функціональних вимірів.

Висновки. Отримані результати свідчать, що дослідження фундаментальних рухових навичок еволюціонували у напрямі інтегративних, компетентнісно орієнтованих і педагогічно застосовних моделей навчання рухів. Разом із тим бібліометричні закономірності вказують на недостатньо досліджені можливості інтеграції когнітивних механізмів і функціональних застосувань поза межами традиційних контекстів фізичного виховання. Дослідження створює структуроване, доказове підґрунтя для подальшого розвитку педагогічно обґрунтованих підходів до навчання FMS і перспективних наукових розвідок.

Ключові слова: фундаментальні рухові навички, моторна компетентність, фізичне виховання, навчання рухів, педагогічна інтервенція, бібліометричний аналіз, тематична еволюція, дослідницькі fronti.

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