Gender Inequality in Motor Development as a Structural Barrier Mechanism in the Sports Industry: Scoping Review

La desigualdad de género en el desarrollo motor como mecanismo de barrera estructural en la industria deportiva: Revisión de Scope

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Abstract

Gender inequality issues within the sports industry are generally reviewed through the lens of sport participation, representation, and elite performance, whereas the formative mechanisms surrounding these issues have yet to be properly researched. Motor development represents the primary intermediary pathway to sport participation and coaching, however the accessibility of these formative movement experiences is inequitably distributed according to gender. The current scoping literature review amalgamates the discussion surrounding gender inequality among motor development and the structural sporting industry impediment that these issues represent. A search through both the Scopus and PubMed libraries yielded a total of 16 studies that represent a broad array of study types, locations, and topics of motor development, all relating to gender inequality. The outcomes of the thematic literary analysis indicate that gender inequality within the domain of motor development is socially led and pathologically contagious to gender inequality in the sporting industry. The current scoping review illustrates the pivotal structural element that motor development represents to improve gender equality within the sporting industry.

Keywords: Gender Inequality, Motor Development, Structural Barriers, Sports Industry

Resumen

Las cuestiones de desigualdad de género en la industria deportiva suelen analizarse a través de la perspectiva de la participación deportiva, la representación y el rendimiento de las élites, mientras que los mecanismos formativos que rodean estos temas aún no han sido investigados adecuadamente. El desarrollo motor representa la vía intermedia principal hacia la participación y el entrenamiento deportivo, sin embargo, la accesibilidad de estas experiencias formativas de movimiento se distribuye de forma desigual según el género. La actual revisión bibliográfica de alcance amalgama la discusión sobre la desigualdad de género en el desarrollo motor y el impedimento estructural de la industria deportiva que representan estos temas. Una búsqueda tanto en las bibliotecas de Scopus como de PubMed arrojó un total de 16 estudios que representan una amplia variedad de tipos de estudio, ubicaciones y temas de desarrollo motor, todos relacionados con la desigualdad de género. Los resultados del análisis literario temático indican que la desigualdad de género en el ámbito del desarrollo motor está socialmente liderada y es patológicamente contagiosa para la desigualdad de género en la industria deportiva. La revisión actual de alcance ilustra el elemento estructural fundamental que representa el desarrollo motor para mejorar la igualdad de género en la industria deportiva.

Palabras clave: Desigualdad de género, Desarrollo motor, Barreras estructurales, Industria deportiva

Introduction

Gender inequality in sport is a global phenomenon that has long been a concern in a variety of disciplines, including the sociology of sport, physical education, and public policy (Evans & Pfister, 2021). A majority of these inequalities have been situated at the level of participation, representation, and resource distribution in competitive and professional sports (Paul et al., 2023). Although these phases matter, the major concentration on later phases of the sport pathway often disregard the initial phase that precedes others. This phase is motor development, which is the basic and initial prerequisite for a lifelong engagement in sport activities (Logan et al., 2018). The motor skills obtained during a young age are not only significantly related to technical skills but are also directly associated with attitudes, motivation, and lifelong engagement in sport activities (Cairney et al., 2019). Nevertheless, looking at the gender aspect, the quality of movement learning opportunities is not always necessarily guaranteed and tends to be heterogeneously distributed (Navarro-Patón, Lago-Ballesteros, et al., 2021).

Comentado [AA1]: Hemos corregido esta y las siguientes secciones relacionadas con la entrada de revisión de acuerdo con la entrada de revisión del editor que dice:
3.2 Coherencia conceptual
- En algunos apartados se alterna el uso de *sex* y *gender* sin una delimitación conceptual explícita. Se sugiere definir claramente el enfoque de género desde el inicio y mantener consistencia.

The girls tend to be limited by the limitations that emanate from social regulation, physical education experience, and the imperative to acknowledge physical activity as a sector belonging to males, thereby limiting the quality, depth, and magnitude of the learning experience on the aspect of motor development (Ricardo et al., 2022).

In the motor development literature, differences in performance between genders are still often explained through individual biological or psychological approaches (D'Anna et al., 2025). This approach tends to separate individuals from the social and structural contexts that frame the experience of movement learning, so that gender inequality is reduced to natural variation between individuals (Patel, 2022). In fact, pedagogical practices, sports policies, as well as organizational structures and sports coaching systems play a significant role in shaping opportunities, expectations, and motor development paths from the early phases of life (Hay & Penney, 2020). Inequality that occurs at the stage of motor development has long-term implications for the path of sports participation (Śmigasiewicz et al., 2021). When access, quality, and continuity of movement learning experiences differ based on gender, the opportunities to enter the path of coaching, selection, competition, and sports professionalization are also unequal (Mossman et al., 2021). Unlike other research studies on motor development, which conceptualized this as a biological/individual issue, this piece considers motor development as a social/structural issue. As such, this article considers inequality in motor development as not only being an issue with girls but as a beginning mechanism where inequality starts being produced in the sports industry as a whole (Cooky, 2023).

Though the field of gender and sport continues to expand in terms of the literature, still relatively few studies have examined the structural issues in the sport industry in conjunction with motor development points of view. Some current systematic reviews tend to point out the structural issues in achieving gender equity in the sport and physical education field, as well as the need for more evidence in developmental points of view (Işıkgöz et al., 2025; Owen et al., 2025; Salvatori & Cherubini, 2024). Existing studies are spread across a wide range of disciplines, use a diverse conceptual framework and methodological approach, and are rarely comprehensively synthesized (Qiu & Gu, 2022). This condition limits the understanding of existing research patterns, tendencies, and gaps, particularly related to how gender inequality in motor development operates as a structural barrier along the path of sport (Evans & Pfister, 2021). Based on these gaps, this article aims to map and synthesize the literature that discusses gender inequality in motor development and its implications for the sports industry using a scoping review approach (M. D. J. Peters et al., 2021). This approach was chosen because it is suitable for examining research areas that are still developing, multidisciplinary, and do not yet have an established conceptual consensus (Tricco et al., 2018). Through this systematic mapping, this article is expected to provide a more structured conceptual foundation for further research, policy development, and more gender-sensitive sports practices (Pape, 2020). In line with the characteristics of scoping review, this study is not intended to evaluate the effectiveness of interventions, but to map the concepts, structural mechanisms, and research patterns that develop in the literature.

Research Questions

To achieve this goal, this scoping review was directed to answer the following research questions:

1. How is the concept of gender defined and operationalized in research on motor development in the context of sport and physical activity?
2. What structural factors contribute to differences in gender-based motor development along the sports pathway?
3. How does inequality in motor development in the early phases function as a structural barrier in the sports industry?
4. What theoretical and methodological gaps still exist in the literature related to gender inequality and motor development?

Conceptual and Theoretical Foundations

Gender Inequality as a Structural Phenomenon in Sport

Gender inequality in sport is defined as an outcome that derives from social structural, policy, and organizational level dynamics that determine the unequal sport participation path for men and women (Indelicato, 2025). Also, using the sociological perspective, current studies reveal that sport acts as an institutionalized social space that is operated using embedded gender social values, and this occurs at the level of organizational structures, sport practices, and organizational policies, this impacts sport

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participants, trainers, and managers, and it isconsidered responsible for creating inequality based on gender in sport (Vaquero-Cristóbal et al., 2024). Within this framework, gender inequality is not only reflected in the level of participation and representation in elite sports, but is also internalized from the early stages through differentiation of movement learning opportunities, gender-based pedagogical expectations, and inequality of access to physical learning environments that support long-term motor development (Salvatori & Cherubini, 2024)

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Motor Development as the Foundation of the Sports Path

Motor development is the main foundation of the sports pathway because it determines the individual's capacity to meet technical and performative demands at the next stage of coaching and competition. Fundamental movement skills (FMS) are considered the *building blocks* that form the basis for more complex skills required in sports and physical activity throughout life (Zhang et al., 2025). Optimally developed motor skills from an early age contribute to motor competence, confidence, and sustainability of sports participation, with evidence showing a positive association between FMS and sustained physical activity engagement (Xu et al., 2024). However, the opportunity to gain a quality movement learning experience is not evenly distributed by gender, given meta-analytical evidence showing significant gender differences in the mastery of basic motor skills in early childhood (Y. Zheng et al., 2022). Factors of the learning environment, including physical education programs in schools, also affect the quality, intensity, and continuity of motor development experiences, and there are indications that current pedagogical practices have not fully addressed these disparities in opportunities (Makaruk et al., 2025). Thus, these differences contribute to the initial selection and exclusion process in the coaching system that is the foundation of the modern sports industry.

Gender Perspectives in Motor Development

The gender approach emphasizes that differences in motor abilities do not arise naturally, but rather are formed through a process of socialization that takes place in specific social and institutional contexts, where the threat of gender stereotypes can affect the learning of motor skills and the performance of motor tasks (Mousavi et al., 2025). In the motor development literature, which centers on individual, biological, or psychological aspects, the role of social structures regarding movement learning opportunities could remain without consideration, as seen by the evolution of gender studies within the realm of physical education, which asserts the need for the study of social norms, stereotypes, and practices influencing the participation of physical education, taking note of the importance of gender studies and gender equality within the sport industry, including sport and physical education and the impact on the health and well-being of women and men, as argued by(Avraam & Anagnostou, 2022). The study of gender and the importance of gender equality within the sport industry" (2022). In this manner, the remedy of motor development differentiation will serve to initially select and exclude within the coaching structure, which forms the basis of the contemporary sport industry (Caracuel-Cáliz et al., 2025).

Motor Development as a Structural Problem within the Sports Sector

Motor development competence can be seen as a structural problem. The sports sector can be described using a systems thinking approach that involves childhood coaching, selection, competition, and professionalization levels, which are interdependent in relation to the individual initial motor experiences of the athletes. The scoping review of the development levels among females proves the presence of gender barriers in the development process of sport pathways through access, opportunities, and support (C. M. Peters et al., 2022). There are fundamental differences in motor competence levels between the sexes in the learning experiences of movements among males and females in a biological sense; it is also related to the learning experiences of movements (J. Zheng & Mason, 2022). Moreover, socioeconomic levels also affect differences in motor competence levels in an overall systemic manner to develop motor competence from childhood (Gosselin et al., 2021).

Materials And Methods

A scoping review is derived as a "knowledge synthesis methodology used to address exploratory research questions by tracing key concepts, types of evidence, and features of research in a field where there is no defined conceptual scope, particularly when the body of literature remains emerging or

fragmented" (Levac et al., 2010; Munn et al., 2018). In contrast to systematic reviews, where researchers concentrate on analyzing intervention effectiveness and estimating research quality, scoping reviews are more concentrated on analyzing the scope of the whole body of literature, encompassing differences between the adoption of theoretical or methodological models across disciplines (Tricco et al., 2018) Based on the objectives, a scoping review was chosen for the synthesis of the scattered literature within the context of the topic of gender inequality in motor development. This was particularly appropriate for the analysis of new topics for which conceptual definitions have not been universally settled within a discipline (M. D. J. Peters et al., 2021).

Protocol and Registration

The process of implementing this review adheres to the methodological guidelines for a scoping review, which shows the researcher has updated by the Joanna Briggs Institute, which highlights the importance of clarity before literature search to systematically formulate research aims, research questions, inclusion/exclusion criteria, and data analysis and synthesis techniques (Hadie, 2024). The reporting of results of the review process is conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) in order to ensure transparent and reproducible research procedures (Tricco et al., 2018).

PCC Framework (Population–Concept–Context)

Population:

In evaluating this review, the population encompasses school-going children, adolescents, as well as those taking part in sports activities as part of physical education, taking place at a very important stage of motor skill formation.

Concept:

The central study concept is that of gender inequality in motor development and movement skills, fundamental movement skills, motor competence, and movement learning. It focuses in particular on social and structural mechanisms of gender-based differentials.

Context:

Encompasses aspects such as incorporating physical education in schools, coaching and sporting selections, as well as organizational frameworks that determine the career lifecycle of sporting individuals and the sporting sector as well.

Inclusion and Exclusion Criteria

Criteria	Inclusion	Exclusion
Population	School-going children and adolescents, including individuals participating in physical education and youth sport during key stages of motor skill formation	Adult populations, clinical populations, or participants not involved in physical education or sport contexts
Concept	Studies explicitly addressing motor development, movement skills, fundamental movement skills, motor competence, or movement learning in relation to physical activity and/or sport	Studies focusing on clinical, therapeutic, or rehabilitative motor aspects without connection to physical activity or sport
Gender Perspective	Studies integrating gender perspectives, either through gender-based data analysis or discussion of social norms and practices influencing motor development	Studies that do not include gender-based analysis or discussion
Context	Studies situated within physical education, sports participation, coaching pathways, sport selection systems, or organizational and institutional sport frameworks	Studies conducted outside educational, social, or sport-related contexts
Structural Dimension	Studies relating motor development findings to social, educational, institutional, or structural contexts, such as coaching experiences or sport policies	Studies explaining motor development solely through individual or biological perspectives without structural linkage
Study Design	Quantitative, qualitative, and mixed-methods research designs	Editorials, commentaries, opinion pieces, and non-empirical papers
Publication Type	Peer-reviewed journal articles	Conference abstracts, grey literature, reports, theses, and dissertations
Language	Articles published in English	Articles published in languages other than English

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- Existen errores menores de gramática y puntuación en inglés (por ejemplo, omisión de puntos, uso inconsistente de mayúsculas y algunas repeticiones).

Comentado [AA8]: Hemos corregido esta y las siguientes secciones relacionadas con la entrada de revisión de acuerdo con la entrada de revisión del editor que dice:
3.3 Metodología
- Aunque el proceso de selección se describe adecuadamente, se recomienda:
  - ✓ Incluir una tabla resumida de criterios de inclusión/exclusión.

Inclusion and exclusion criteria in this review of coverage, inclusion and exclusion criteria were clearly established to ensure the relevance of the analyzed literature. First, research was included that was a study explicitly discussing motor development, movement skills, or movement learning in the context of physical activity and/or sport (Janke van der et al., 2020). This definition differentiated the study of motor development from research dealing explicitly with clinical or rehabilitative aspects without connection to sport, so that only research directly relevant to sports activities is included (Oldörp et al., 2025). The selected study has to integrate gender perspectives through data analysis by gender or discussion of social norms and practices that affect the motor development experiences of women and men (C. M. Peters et al., 2022). Additionally, the included research should relate the findings to a social, educational, institutional, or structural context, for example, experience in the path of coaching or sports policy (De Maio et al., 2025). This review focused on English language literature, because it is considered the lingua franca in international scientific publications in the fields of sport and social sciences (Wilson et al., 2024). Selection includes only peer-reviewed journal articles with the aim of ensuring scientific reliability; therefore, editorials, conference abstracts, and grey literature were excluded (Kliethermes et al., 2024). Research designs included quantitative, qualitative, and mixed-methods approaches to capture the diversity of available evidence (De Maio et al., 2025).

Literature Search Strategy

The search for literature was carried out in December 2025 by the first author using international scientific databases Scopus and PubMed. Both of these sources were selected for broad scope and relevance to cross-disciplinary research in the fields of motor development, gender, and sport (Mamikutty et al., 2021). The search strategy is created keeping in mind the three key concepts: Domains (Levac et al., 2010), specifically, within the context of this study: gender, motor development, and sports as an institutional framework. In the Scopus database, search terms include: International Baccalaureate. Keyword combinations: (gender OR women OR girls OR female*) AND ("motor development" OR "motor skill*" OR "movement skill*" OR "fundamental movement skill*" OR "motor learning" OR "physical literacy") AND (sport* OR "physical activity" OR "physical education" OR "sport participation" OR "sport development"), while for PubMed, it is conducted by The following keyword combinations entered into the title and abstract fields: *(gender OR sex differences OR women OR girls OR female*) AND ("motor development" OR "motor skills" OR "movement skills" OR "fundamental movement skills" OR "motor learning") AND ("physical activity" OR "physical education" OR sport*). The search is tailored for each database. The combinations of keywords that encompass all three categories are joined together using Boolean 'AND' and 'OR' operators, along with wildcards, to further increase the search scope due to variations of terms used across the literature. The aim of this search is to seek out relevant literature that relates to gender inequality regarding motor development, its connection to pathways, and sport development.

Study Selecting Process

The study selection process was conducted in several sequential stages. First, a compilation of all records of search results from different databases without removing duplicates takes place. In addition, initial screening involves title and abstract screening for assessment of appropriateness with regards to inclusion criteria. Full text assessment is conducted on the studies selected to be in the systematic review according to the principles of feasibility (M. D. J. Peters et al., 2021). In selecting studies, a flowchart of the PRISMA-ScR flowchart is required. The selection of studies is enlightened by the process of being mainly performed by the first author of the research paper in the sense that the author examines the search results on the basis of the stipulated criteria of selection and exclusion.

Data Extraction and Mapping

In order to critically appraise the studies that have been identified, a charting table has been constructed according to the guidelines proposed by (Arksey & O'Malley, 2005). This table is used as as-transitional tool for interpreting the results of studies that have been included. The retrieved data encompasses publication details of authors, geographical setting, study framework, subject of research, research participants, focus of motor development study, gender aspect studied, as well as findings of studies under focus, which concern essential studies regarding structural themes as they influence the sports sector. A map-based studies approach can be used to identify concepts, research gaps, as well as research themes present in dispersed studies across various fields of study (Molfenter et al., 2013). Data

Comentado [AA9]: Hemos corregido esta y las siguientes secciones relacionadas con la entrada de revisión de acuerdo con la entrada de revisión del editor que dice:
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Existen errores menores de gramática y puntuación en inglés (por ejemplo, omisión de puntos, uso inconsistente de mayúsculas y algunas repeticiones).

Comentado [AA10]: Hemos corregido esta y las siguientes secciones relacionadas con la entrada de revisión de acuerdo con la entrada de revisión del editor que dice:
Incluya referencias, especialmente de los últimos cuatro años que sean relevantes para su trabajo (2022, 2023, 2024 y 2025).

Comentado [AA11]: Hemos corregido esta y las siguientes secciones relacionadas con la entrada de revisión de acuerdo con la entrada de revisión del editor que dice:
3.3 Metodología
- Aunque el proceso de selección se describe adecuadamente, se recomienda:

✓ Precisar si el proceso de extracción de datos fue realizado por uno o más revisores (para reforzar transparencia).

extraction and charting were done by the first author using a structured data extraction table. The data extracted and charting framework were then reviewed and discussed with co-authors to ensure clarity and alignment with the objectives of the scoping review.

Data Analysis and Synthesis

Data analysis was done through descriptive analysis and the thematic analysis method. This involves the description of general features in the literature in order to establish the spread of the studies according to the time they were published and the spatial setting, and the methodology adopted in the studies (Mak & Thomas, 2022). Moreover, through the thematic analysis method, the prominent themes that indicate the general trends in the literature on the mechanisms through which inequalities in motor development occur in terms of their association and connection to the structural barriers in the sports industry have been established (Lungu, 2022). The prominent themes revealed in the analysis have been incorporated in the data mapping table and then utilized in summarizing the data in the narrative (Christou et al., 2025).

To strengthen the analytical coherence between the study selection process and the presentation of results, each included study was interpreted not only in terms of reported motor performance outcomes, but also in relation to the underlying structural mechanisms discussed by the authors. These mechanisms include differential access to movement learning opportunities, gendered pedagogical practices, early sport socialization patterns, and institutional selection processes within sport development systems. This analytical approach enables the results to move beyond descriptive comparisons of performance and to position motor development as a structural mechanism contributing to the reproduction of gender inequality in the sports industry.

Results

A literature search through the Scopus and PubMed databases yielded a number of articles relevant to the topic of gender inequality in motor development. After duplicate records were removed and titles and abstracts were screened, eligible articles were reviewed in full-text form. Based on the final selection process, a total of 16 studies met all inclusion criteria and were included in this scoping review. The study selection flow is presented systematically using the PRISMA-ScR diagram (Figure 1).

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Comentado [AA13]: Hemos corregido esta y las siguientes secciones relacionadas con la entrada de revisión de acuerdo con la entrada de revisión del editor que dice:
3.3 Metodología
En la sección de resultados, podría reforzarse la conexión directa entre cada estudio y los mecanismos estructurales (no solo diferencias de rendimiento).

Comentado [AA14]: Hemos corregido esta y las siguientes secciones relacionadas con la entrada de revisión de acuerdo con la entrada de revisión del editor que dice:
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Existen errores menores de gramática y puntuación en inglés (por ejemplo, omisión de puntos, uso inconsistente de mayúsculas y algunas repeticiones).

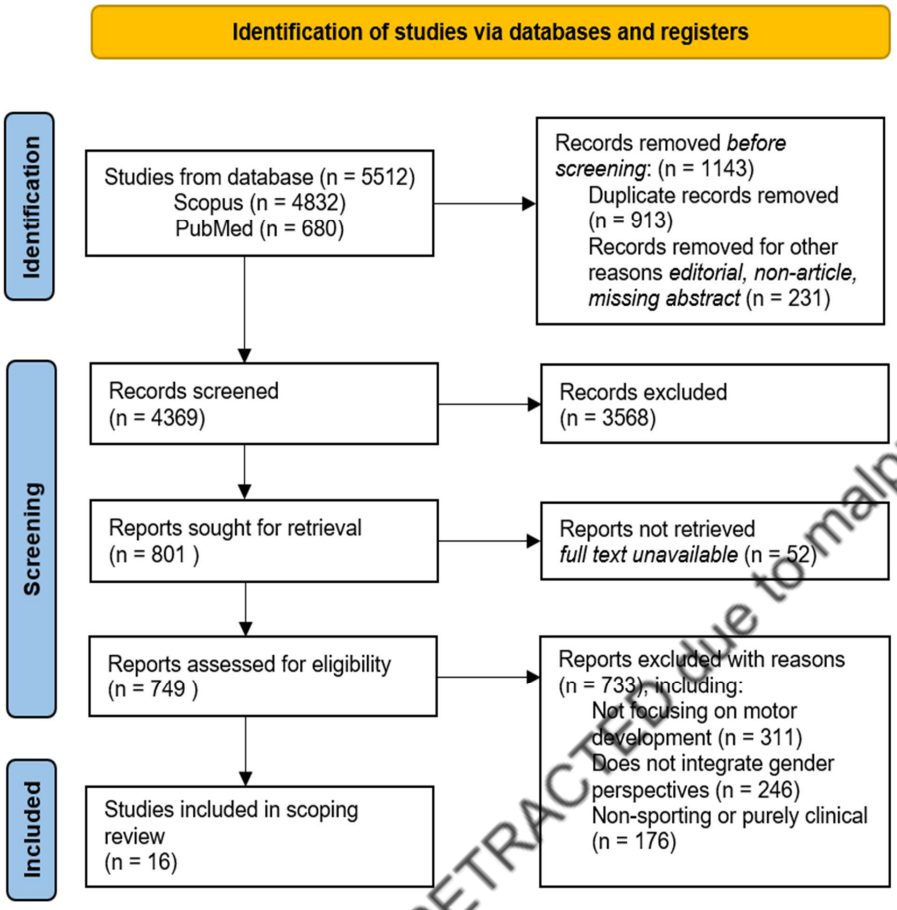

Figure 1. Flowchart PRISMA ScR

General Characteristics of Included Studies

The sixteen included studies demonstrated diversity in research design, geographic context, and analytical focus. The majority of studies used a cross-sectional design, while others used longitudinal, experimental approaches, as well as systematic reviews and meta-analyses. Populasi penelitian didominasi oleh anak usia prasekolah dan sekolah dasar, dengan beberapa studi melibatkan remaja dan atlet muda. Domain perkembangan motorik yang paling sering diteliti meliputi keterampilan motorik fundamental, kompetensi motorik, dan keterampilan kontrol objek. Commonly used assessment instruments include the Test of Gross Motor Development (TGMD), Movement Assessment Battery for Children (MABC), Körperkoordinationstest für Kinder (KTK), and Motorische Basiskompetenzen (MOBAK). All studies analyzed differences or dynamics of motor development based on gender, both through performance comparisons, developmental trajectories, and the influence of social and institutional contexts. The main characteristics of the included studies are summarized in Table 1.

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Author (Year)	Study Design	Population	Motor Skill Domain	Gender Dimension	Data Source / Instruments	Structural Mechanism	Sports Industry Pathway	Key Findings
(Hurtado-Almonacid et al., 2024)	Cross-sectional	Children aged 3–10 years, Chile	Fundamental motor skills	Differences in motor performance between boys and girls	Test of Gross Motor Development, 2nd edition (TGMD-2)	Inequality in access to motor practice and training	Inclusive motor skill training strategies	Some domains do not differ significantly, but developmental patterns vary by age and gender.
(D'Anna et al., 2025)	Cross-sectional	Children aged 3–11 years	Gross motor skills	Gender differences in motor performance across age groups	Test of Gross Motor Development, 3rd edition (TGMD-3)	Gender-based norms in physical activity	Talent identification	Gender gap increases with age
(Barnett et al., 2016)	Systematic review and meta-analysis	Children and adolescents	Object control and locomotor skills	Developmental trajectories of boys versus girls	Test of Gross Motor Development (TGMD-2)	Accumulation of unequal motor experiences	Sport participation	Early object control predicts later sport participation
(Dinkel & Snyder, 2020)	Observational	Infants and parents	Early motor development	Differences in motor stimulation between male and female infants	Play observation and parent interviews	Gender socialization within the family	Motor foundation	Motor stimulation differs by gender
(Navarro-Patón, Arufe-Giráldez, et al., 2021)	Cross-sectional	Preschool children (5 years)	Motor competence	Comparison of motor domains between boys and girls	Movement Assessment Battery for Children, 2nd edition (MABC-2)	Relative age bias in assessment	Talent identification	Differences observed in specific motor domains
(Navarro-Patón, Arufe-Giráldez, et al., 2021)	Cross-sectional	Preschool children (4 years)	Motor competence	Gender differences in domain performance	Movement Assessment Battery for Children, 2nd edition (MABC-2)	Interaction between age and gender	Readiness evaluation	No difference in total motor scores
(Bardid et al., 2013)	Cross-sectional	Children aged 6–9 years	Fundamental motor skills	Gender gap in object control skills	Test of Gross Motor Development, 2nd edition (TGMD-2)	Unequal access to motor training	Athlete pathway	Girls show lower object control performance
(Fernández-Sánchez et al., 2022)	Longitudinal	Elementary school children	Motor coordination	Stability of gender differences over time	Körperkoordinationstest für Kinder (KTK)	Long-term consistency of physical activity	Performance-based selection	Gender differences remain stable
(Chen et al., 2024)	Cross-sectional	Preschool children	Gross motor skills	Comparison of motor scores between boys and girls	Standardized gross motor skill tests	Inequality in access to physical activity	Early talent development	Boys demonstrate higher scores
(Utesch et al., 2019)	Cross-sectional	Elementary school children	Motor competence	Gender differences in motor performance	Motorische Basiskompetenzen Instrument (MOBAK)	Gender bias in physical education curricula	Sport readiness	Boys outperform girls
(Brian et al., 2025)	Randomized controlled trial	Preschool children	Object control skills	Gender stereotypes among boys and girls	Test of Gross Motor Development, 3rd edition (TGMD-3) and stereotype scales	Gender stereotypes in learning contexts	Inclusive intervention	Gender gap reduced following intervention
(Robinson et al., 2015)	Systematic review	Children and adolescents	Gross motor skills	Consistent gender differences	Systematic synthesis	Interaction of biological and social factors	Physical education policy	Gender as a consistent factor
(Y. Zheng et al., 2022)	Meta-analysis	Children aged 3–6 years	Fundamental motor skills	Global patterns of gender differences	Quantitative synthesis	Cross-cultural socialization patterns	Global inequality	Cross-cultural patterns observed
(Martins et al., 2024)	Pooled cross-sectional	Preschool children aged 3–5 years	Motor competence	Interaction between age and gender	Test of Gross Motor Development (TGMD)	Variation in age-related motor experience	Timing of intervention	Variation according to age
(Logan et al., 2015)	Systematic review	Early childhood	Fundamental motor skills	Comparison between boys and girls	Test of Gross Motor Development, 2nd edition (TGMD-2)	Learning environments limit exploration	Physical literacy	Boys show higher performance
(Barnett et al., 2024)	Cross-sectional	School-aged children	Motor skills and physical activity	Gender differences in developmental trajectories	Objective motor competence and physical activity measures	Differential motor–activity relationship	Sport participation sustainability	Distinct relationship patterns by gender

Table 1. General Characteristics Information of Included Studies

Thematic Synthesis of Study Findings

Thematic synthesis of the included studies identifies four main themes that represent dominant patterns in the literature regarding gender inequality in motor development and its relationship to sports participation and coaching pathways. These four themes illustrate how differences in gender-based motor development emerge from an early age, are influenced by the context of the learning environment, and have implications for access and sustainability of sports participation.

Theme 1: Differentiation of Gender-Based Motor Competencies from an Early Age

Most studies report that there is a differentiation in motor competence between boys and girls that has been observed since preschool age. The most consistent pattern was found in object control skills, where boys performed higher than girls. Meanwhile, findings related to locomotor skills showed variation between studies, with some studies reporting minimal or inconsistent gender-based differences, depending on age group and measurement context. The included longitudinal studies show that gaps in object control skills tend to persist or increase with age, although the magnitude of the differences varies between research contexts.

Theme 2: Learning Environment and Gender Socialization

A number of studies have identified the role of the learning environment and the process of gender socialization as factors related to gender-based motor development patterns. Differences in the type of physical activity, frequency of motor stimulation, and social expectations in the family environment, school physical education, and structured physical activity are reported to affect children's movement learning experiences. The studies showed that boys tended to gain greater exposure to activities that stimulate object control skills and competitive play, while girls were more likely to engage in activities with different or more limited motor demands. This pattern appears consistently in a variety of research contexts, although its intensity and shape vary.

Theme 3: Sports Coaching and Selection System

Several studies highlight the link between early motor competence and the process of talent identification and selection in the sports coaching system. Motor competence, particularly object control skills, is often used as an indicator of readiness and athletic potential in the early stages of coaching. These studies show that children with higher levels of motor competence have a greater chance of entering advanced coaching pathways, participating in organized competitions, and gaining access to training resources. In contrast, children with lower motor competence tended to be screened earlier than the coaching system, although contextual factors and selection policies differed between studies.

Theme 4: Consequences for the Path of Sport Participation

The included studies also reported on the relationship between early motor competence and patterns of physical activity and exercise participation along the developmental pathway. Differences in gender-based motor development were associated with variations in the sustainability of sport participation, opportunities to enter organized sport, and involvement in achievement coaching systems. Some studies have shown that higher motor competence at an early age correlates with more stable levels of sports participation later in life, while limited motor competence is associated with decreased participation or disengagement in sports activities.

Based on the synthesis of findings, the results of the scoping review show that the existing literature consistently describes the emergence of gender inequality in motor development from an early age, its relationship with the learning environment and the process of gender socialization, as well as its implications for the coaching system and sports participation pathways. These findings reflect the patterns and characteristics of existing research without conducting methodological quality assessments or drawing causal inferences, in accordance with the objectives and approach of the scoping review.

Discussion

This scoping review demonstrates that gender inequality in the sports industry cannot be adequately understood as a phenomenon that emerges only at the final stages of elite

performance. Instead, the findings indicate that inequality is progressively constructed from early phases of motor development, where access to movement learning opportunities is unevenly distributed between boys and girls. Rather than reiterating the results, this discussion interprets the findings in relation to existing literature, theoretical perspectives, and their broader structural and policy implications.

Although many of the included studies report gender-based differences in motor competence particularly in object control skills, it is essential to emphasize that these differences are not universal nor biologically predetermined. A number of studies included within this literature review have found no significant difference with respect to overall motor competence for boys and girls, particularly among preschool-aged children and under conditions where learning is more balanced for both, Furthermore, there is no way of accurately ascertaining consistency with respect to locomotor skills among differing studies, given that some have found negligible differences (e.g., Navarro-Patón, Lago-Ballesteros, et al., 2021; Martins et al., 2024), among other conditions.

The coexistence of studies that identify gender differences with those that do not reinforces the interpretation of motor development as a socially and structurally produced process. As highlighted across the reviewed literature, the learning environment whether within the family, school-based physical education, or organized sport plays a decisive role in shaping movement experiences. Boys are more frequently exposed to activities that emphasize object control, competition, and spatial dominance, whereas girls often encounter more limited or stereotyped movement opportunities. This pattern of gender socialization, documented consistently across multiple contexts in the included studies, supports the argument that early motor inequalities emerge from differential exposure and expectations rather than innate ability.

In terms of the system of sports coaching and development, inequalities in motor competence serve as a first-stage structural filter (Till & Baker, 2020). Motor competence has emerged as a widely accepted proxy for readiness and talent in talent selection and development activities (Barnett et al., 2016). A level of motor competence establishes who gets more structured coaching and development and who gets filtered out at a relatively early stage, with better motor competence leading to more movement learning and experience and consequently leading better-developed movement skills, while the less competent ones get filtered out relatively quickly. Girls, being more impacted by limited movement learning opportunities, create a structural filter for gender inequity along this athletic path and, as a result, underdevelopment of women at an advanced level should be made apparent as not individually lacking but structurally uneven development conditions (Morrow et al., 2010; (Gosselin et al., 2021).

These outcomes have crucial implications and suggest that proactive approaches are needed in physical education lessons because recently implemented intervention programs with the aim to decrease gender bias within the process of teaching motor skills resulted in increased proficiency in object control among preschool children and a reduction in gender stereotypes (Palmer et al., 2020). In talent development and intervention programs, the thoughtfully organized program, Children's Health Activity Motor Program, showed a substantial increase in perceived motor competence and Object Control expertise compared to unstructured play, suggesting that early selection solely based on proficiency may ignore those children who are not provided with appropriate support through thoughtfully organized programs (George-Komi et al., 2023). There should be proper policy guidance regarding the incorporation of the role of factors concerning motor competence because the influence of the environment and cognitive-motor interaction effects were recently validated and proved to have a prominent role in comprehensive motor development from early childhood through adolescence (Ghorbanzadeh et al., 2025).

Comentado [AA16]: Hemos corregido esta y las siguientes secciones relacionadas con la entrada de revisión de acuerdo con la entrada de revisión del editor que dice:
3.4 Discusión
•La discusión es sólida, pero en algunos tramos resulta reiterativa respecto a los resultados.

Comentado [AA17]: Hemos corregido esta y las siguientes secciones relacionadas con la entrada de revisión de acuerdo con la entrada de revisión del editor que dice:
3.4 Discusión
Se sugiere:
✓ Incorporar contrastes explícitos con estudios que no hallan diferencias de género, para enriquecer el análisis crítico.

Comentado [AA18]: Hemos corregido esta y las siguientes secciones relacionadas con la entrada de revisión de acuerdo con la entrada de revisión del editor que dice:
3.4 Discusión
✓ Vincular más directamente los hallazgos con políticas públicas concretas (educación física, detección de talentos, igualdad de género).

Comentado [AA19]: Hemos corregido esta y las siguientes secciones relacionadas con la entrada de revisión de acuerdo con la entrada de revisión del editor que dice:
3.4 Discusión
✓ Vincular más directamente los hallazgos con políticas públicas concretas (educación física, detección de talentos, igualdad de género).

Overall, this discussion underscores that gender inequality in the sports industry is not a late-stage anomaly but a structural process initiated during early motor development. Addressing this issue requires early, coordinated, and policy-driven interventions that focus on the conditions shaping movement learning, rather than solely on outcomes observed at the elite level.

Implications for Policy and Practice

The implications for these findings are extensive for policies within physical education, early age sport coaching structures, and the governance of sports as a whole. The curriculum for physical education must be reshaped in order for an equal, diverse, and gender stereotypically structured movement learning experience to occur, especially within object-control movements, which display regular gender inequality discrepancies. A pedagogical approach that is merely gender-neutral has proven inadequate; An affirmative strategy is needed that actively expands movement learning opportunities for girls. In addition, the talent identification and athlete selection system needs to consider the inequality of movement learning opportunities that children have experienced since the early stages of development. The use of initial motor performance criteria without considering the social and pedagogical context has the potential to reproduce structural exclusion in the path of sports coaching. Therefore, the evaluation of an athlete's potential should *adopt a long-term athlete development* approach, instead of focusing solely on current motor performance. Furthermore, policymakers and sports organizations need to position motor development as an issue of structural justice, not just a problem of individual deficits, with integrated interventions between physical education, community sports, and national development policies.

Theoretical Contributions

The main contribution of this article lies in the repositioning of motor development as an early structural mechanism in the reproduction of gender inequality in the sports industry. By mapping the relationship between early motor experiences, coaching systems, and the structure of the sports industry, this article expands the understanding of how gender inequality is produced and reproduced across developmental stages and across institutional systems. This approach complements the literature that has been more focused on representation and participation in the later stages of the sport pathway by highlighting the structural foundations of inequality that formed much earlier.

Methodological Limitations

Although it provides a comprehensive mapping of the literature, this study has some limitations. The number of studies identified is relatively limited, reflecting the ongoing research that explicitly integrates the perspectives of motor development, gender, and the structure of the sports industry. In addition, the focus on English-language literature has the potential to exclude relevant studies published in other languages (Pirri et al., 2020). As a scope review, this study is exploratory and does not aim to conduct a methodological quality assessment of the included studies, so the presented findings are not intended to produce causal inferences.

Further Research Direction

Further research needs to integrate longitudinal approaches to track the long-term impact of motor development on the pathways of participation and coaching of sport, cross-cultural analysis to understand variations in social and policy contexts, and exploration of physical education policies and sports coaching systems as a form of structural intervention oriented towards gender justice.

Conclusion

This scoping review reveals that gender inequality in the sports industry is rooted in motor development from an early age, shaped by the unequal distribution of motion learning opportunities, not solely by biological differences. Motor competence, particularly object control skills, serves as an early structural selection mechanism in the path of sports coaching that cumulatively reproduces gender inequality to the elite level. By repositioning motor development as the structural foundation of gender inequality, it confirms that efforts to achieve gender equality in the sports industry must start from interventions in the earliest phases of children's motor development.

Conflicts of Interest

The authors declare no conflict of interest

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