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Comparison of Gross Motor Skills among Students Participating in Futsal Extracurricular Activities: A National Literature Review (2020–2025)

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ABSTRACT

This study aims to examine differences in gross motor skills between students who participate in futsal extracurricular activities and those who do not, through a national literature review covering publications from 2020 to 2025. Gross motor development is a fundamental component of children's physical growth and plays a crucial role in supporting learning readiness and physical activity engagement. This study employed a descriptive–analytical literature review method by synthesizing empirical findings from nationally accredited Indonesian journal articles. Article selection was conducted using predefined inclusion criteria: studies involving school-aged students, focusing on gross motor skills or sports-related physical activities, employing quantitative, qualitative, or mixed-methods research designs, and being accessible online in peer-reviewed national journals. The data analysis process involved grouping selected articles according to research focus, identifying key gross motor components (speed, agility, coordination, balance, strength, and endurance), and conducting a comparative synthesis between students who actively participated in futsal extracurricular programs and those who did not. The results consistently indicate that students engaged in futsal extracurricular activities demonstrate superior gross motor performance across most components compared to non-participating students. These advantages are attributed to the dynamic, high-intensity, and game-based characteristics of futsal, which provide varied and continuous movement stimulation, promote neuromuscular adaptation, and enhance overall physical fitness. The findings suggest that futsal extracurricular activities not only support the development of fundamental movement skills but also function as an effective extension of formal physical education, particularly in contexts where instructional time for Physical Education, Sports, and Health is limited. In conclusion, futsal extracurricular programs contribute positively to students' gross motor development and are recommended as a complementary strategy for schools to enhance physical and motor competence in children.

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A. Conception and design of the study;
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INTRODUCTION

Gross motor development is one of the main foundations for the growth and development of school-age children. Gross motor skills encompass the ability to perform

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movements involving large muscle groups, such as running, jumping, kicking, throwing, maintaining balance, and overall body coordination. These skills not only play a role in a child's physical readiness for activities but also contribute to their cognitive, social, and emotional development. Children with well-developed gross motor skills tend to have higher self-confidence, more active social participation, and optimal learning readiness in the school environment (Herdini & Darmayanti, 2024; Yuliandra et al., 2023).

However, various national studies indicate that the gross motor skills of elementary school students in Indonesia remain in the moderate to low category, particularly in the areas of agility, coordination, and balance (Nurul Safitri Ramadhani et al., 2024; Siantoro et al., 2024). This situation is influenced by several factors, including limited structured physical activity, increasing sedentary lifestyles among children, and limited time allocated for Physical Education, Sports, and Health (PJOK) in elementary schools (Ika Novitaria, 2024; Sahabuddin, 2025). As a result, the movement stimuli that children should receive during the golden phase of motor development are suboptimal.

Limited PJOK learning time and the relatively large student population also result in uneven physical activity intensity for each student (Heni Widyaningsih, 2021; H. Setiawan & Gani, 2021). Gross motor development requires repeated, continuous practice in physically challenging situations to ensure optimal neuromuscular adaptation (Insyur et al., 2025; Zulia Syiva Salsabila & Rivan Saghita Pratama, 2024). This situation emphasizes the need for additional activities outside of formal school hours to accommodate students' physical activity needs in a more intensive and structured manner.

Extracurricular sports activities in schools are seen as an effective strategy for sustainably increasing student physical activity. Extracurricular sports programs provide students with opportunities to gain more varied, structured movement experiences tailored to the characteristics of the sport they participate in (Intan Oktaviani Agustina et al., 2023; Pasaribu et al., 2024). Several studies have shown that students who actively participate in sports outside of class have better physical fitness and motor skills than students who are physically inactive (Aprilyanti et al., 2025).

Among the various types of extracurricular sports, futsal is one of the most popular among students. Futsal is characterized by its fast, dynamic gameplay, and demands continuous physical involvement. Typical futsal movements, such as short sprints, sudden changes of direction, dribbling, kicking, and maintaining balance when facing an opponent, provide a powerful stimulus for gross motor development, particularly in the components of speed, agility, coordination, strength, and balance (Galuh Alam, 2021; Ibnu Prasetyo Widiyono, 2021).

National research reports that game-based sports activities, including futsal, can provide more comprehensive movement stimulation than non-game physical activities. Students involved in games demonstrate better gross motor skills, particularly in locomotor and manipulative skills (Sari, 2023; Surya Fallo et al., 2024). Setiawan (2025) emphasized that games provide a rich movement context because they require decision-making, eye-foot coordination, and rapid movement adaptation. Similar findings were also presented by Latifah and Fahri (2025), who stated that ball games contribute significantly to improving students' gross motor skills.

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Although numerous studies have been conducted on sports activities and gross motor development, most research in Indonesia still discusses sports activities in general without distinguishing between the type of sport or its movement characteristics. Furthermore, research specifically comparing gross motor skills between students participating in specific extracurricular sports activities—such as futsal—and students who do not participate in extracurricular sports is still very limited (Yuliandra et al., 2023).

In fact, each sport has different movement demands and has the potential to have a different impact on children's gross motor development. Futsal, with its high intensity and complex movement patterns, is thought to provide richer motor stimuli than general physical activity. However, scientific evidence systematically examining and comparing differences in gross motor skills based on student involvement in futsal extracurricular activities remains lacking in the national literature.

Furthermore, some studies still focus on the final results of physical activity without linking them to the context of limited physical education (PJOK) learning in schools and the strategic role of extracurricular activities as a solution to strengthen motor stimuli (Sahabuddin, 2025; Rida Satriawan et al., 2024). This gap indicates the need for a literature review that specifically positions extracurricular futsal as a key variable in students' gross motor development, while also comparing it with non-extracurricular student groups.

Based on these research issues and gaps, this article aims to present a comprehensive national literature review comparing gross motor skills between students participating in extracurricular futsal activities and those not participating in extracurricular sports activities. This study aims to identify patterns of empirical findings, the characteristics of futsal movement stimuli, and their implications for the gross motor development of school-aged children.

The novelty of this research lies in the analytical focus, which specifically positions extracurricular futsal as the primary context for gross motor development, rather than simply a general sports activity. Furthermore, this article integrates empirical findings with the context of limited physical education (PJOK) learning in schools, thus providing an applicable perspective for the development of physical education policies and practices. The results of this study are expected to serve as a scientific reference for schools, PJOK teachers, and extracurricular activity managers in designing more effective, structured, and oriented sports programs that address students' motor development needs.

METHODS

This study employed a national literature review design using a descriptive-analytical approach to systematically examine and synthesize empirical evidence related to gross motor skills among students participating in futsal extracurricular activities compared to those who did not participate. A literature review method was selected

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because it enables comprehensive mapping of research trends, identification of consistent findings, and critical comparison of outcomes across multiple studies within a defined scope and period (Snyder, 2019; Booth et al., 2021).

Data Sources and Search Strategy

The data sources consisted of Indonesian national journal articles published between 2020 and 2025, accessed through reputable academic databases and journal portals such as Google Scholar, Garuda, SINTA, and institutional journal repositories. The focus on national journals was intended to capture contextually relevant evidence reflecting the characteristics of Indonesian students, school environments, and extracurricular sports practices (Yuliandra et al., 2023; Pasaribu et al., 2024).

The literature search used combinations of keywords, including gross motor skills, fundamental movement skills, futsal extracurricular, sports extracurricular activities, students, and physical education. These keywords were applied in both Indonesian and English to ensure comprehensive retrieval of relevant studies (Sari, 2023; Surya Fallo et al., 2024).

Inclusion and Exclusion Criteria

Articles were selected based on the following inclusion criteria: (1) the study examined gross motor skills, fundamental movement skills, or related motor components (e.g., agility, balance, coordination, speed, or strength); (2) the participants were school-aged students (elementary to secondary level); (3) the study investigated sports activities or extracurricular programs, including futsal or comparable game-based sports; (4) the research employed quantitative, qualitative, or mixed-methods designs; (5) the article was published in national peer-reviewed journals and available in full-text online format.

Studies were excluded if they focused exclusively on elite or professional athletes, addressed non-school populations, or lacked sufficient methodological clarity and relevance to the research objectives (Setyawan et al., 2023; Wisudaningsih et al., 2025).

Data Extraction and Analysis

The analysis process followed several systematic stages. First, selected articles were organized and grouped according to research focus, study design, participant characteristics, and type of physical activity examined. Second, key findings related to gross motor outcomes were extracted, including indicators of locomotor, non-locomotor, and manipulative skills (Pratama et al., 2025; Humairah, 2024). Third, the results were synthesized using a descriptive–comparative technique to identify general patterns, similarities, and differences between students who participated in futsal extracurricular activities and those who did not.

This synthesis emphasized the comparative dimension, particularly differences in motor performance associated with structured, game-based sports participation. Conceptual interpretation was guided by motor development and physical activity theories, highlighting the role of movement intensity, task variability, and environmental context in shaping gross motor development (Rohmah & Nur Muhammad S-, 2021; Fadilah et al., 2025).

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Trustworthiness and Analytical Rigor

To enhance analytical rigor, findings were cross-checked across multiple studies to ensure consistency and reduce interpretative bias. The synthesis integrated both empirical evidence and theoretical perspectives, enabling a balanced interpretation of results and strengthening the validity of conclusions drawn (Snyder, 2019; Sahabuddin, 2025).

RESULTS AND DISCUSSION

Result

Comparison of Gross Motor Skills Between Physically Active and Inactive Students

The synthesis of various national journal studies indicates that the level of physical activity has a strong relationship with students' gross motor skills. Students who actively participate in sports activities on a regular basis, either through physical education classes or extracurricular activities, tend to have higher gross motor skill scores than students who are less physically active (Fatoni et al., 2021; Kustari & Mahendra, 2020).

Several studies report that students who are rarely involved in physical activities experience limitations in locomotor and manipulative skills. In contrast, physically active students demonstrate better and more coordinated abilities in running, jumping, and kicking (Arif Hidayat, 2022; Humairah, 2024). These findings indicate clear differences in gross motor skills between physically active and inactive students.

Impact of Futsal Extracurricular Activities on Speed and Agility

The literature review shows that students who participate in futsal extracurricular activities have better speed and agility compared to students who do not participate in such activities. This is evidenced by higher scores on sprint tests and agility tests among students involved in futsal extracurricular programs (Afifuddin Nur Lutfillah & Wibowo S-, 2021; Siregar, 2023).

Research by (Khotimah, 2020) reported that team sports, such as futsal, provide greater agility stimulation than individual sports. In addition, futsal training has been shown to improve reaction speed and movement speed among school students (Munggaran et al., 2024).

One of the training methods used in futsal involves the use of tennis ball media to measure the effect of such training on improving futsal players' reaction speed. The descriptive statistical results are presented as follows:

Tabel 1.
Descriptive Statistics of Reflex Test Results

	N	Minimum	Maximum	Mean	Std. Deviation
Pre Test	14	20	45	35.71	9.376
Post Test	14	70	80	73.57	4.127
Valid N (listwise)	14				

The results of the descriptive statistics test were used to determine the minimum and maximum values of the pre-test and post-test, as well as the mean scores of the

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data. The findings indicate a significant effect of training using tennis ball media on improving the reaction speed of futsal goalkeepers. The mean pre-test score was 35.71, while the mean post-test score increased to 73.57 (Munggaran et al., 2024).

Effect of Futsal Extracurricular Activities on Coordination and Balance

Research findings indicate that students who participate in futsal extracurricular activities have better eye–foot coordination and body balance compared to students who do not participate in such activities (mashud. Hamid, 2020).

Repeated dribbling and kicking activities performed during futsal training contribute positively to improvements in students' movement coordination and balance. Furthermore, students' body balance improves along with the intensity of regular futsal training (Kecepatan et al., 2020; Nuriati et al., 2025)

Effect of Futsal Extracurricular Activities on Strength and Endurance

The literature review indicates that futsal extracurricular activities contribute to improvements in students' muscle strength and endurance, particularly lower limb explosive power. One of the training combinations commonly applied in futsal includes jump rope exercises and ladder drills (Norman et al., 2025).

Figure 1.
Graph of Improvement in Lower Limb Explosive Power

The graph illustrates that the combination of jump rope and ladder drill exercises significantly improves children's athletic abilities, particularly in enhancing lower limb explosive power. Jump rope training has been shown to produce beneficial physiological effects, including strengthening leg muscle fibers and increasing muscle mass and tone. These effects directly contribute to improved muscular performance (Norman et al., 2025)

These findings are consistent with previous studies reporting that students who regularly engage in sports activities demonstrate better gross motor skills than inactive students (Kecepatan et al., 2020; Norman et al., 2025). Other studies also indicate that game-based physical activities have positive effects on students' locomotor and manipulative skills (Pratama et al., 2025; Saputra et al., 2024)

The results of the analysis of articles that met the inclusion criteria are presented in Table 3. This table summarizes studies related to gross motor skills and students' sports activities, including the authors, year of publication, research methods, research subjects, research focus, and key findings relevant to the objectives of this review.

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Table 2.
Summary of Literature on Gross Motor Skills and Students' Sports Activities

No	Author (s)	Year	Subjects	Research Focus	Main Findings
1	Kustari & Mahendra	2020	Elementary School Students	Students' Gross Motor Skills	Gross motor skills are influenced by variations in movement activities adapted to students' physical conditions.
2	Abduh et al.	2020	Students	Physical Fitness	There is a significant relationship between physical fitness levels and students' learning outcomes.
3	Fatoni et al.	2021	Students	Gross Motor Skills Program	Sports activities significantly influence improvements in students' gross motor skills.
4	Arif Hidayat	2021	Elementary School Students	Fundamental Movement Activities	Improvements in locomotor and non-locomotor movement skills were observed.
5	Adi et al.	2022	Children Aged 6–12 Years	Traditional Games	Traditional games improve children's balance and coordination..
6	Setyawan et al.	2023	Elementary School Students	Gross Motor Skill	Sports activities significantly affect students' physical fitness and gross motor skills..
7	Sari, N. P.	2023	Elementary School Students	Futsal Extracurricular Activities	Futsal extracurricular activities contribute to improvements in students' gross motor skills.
8	Nurul Safitri Ramadhani et al.	2024	Elementary School Students	Gross Motor Skills	There are differences in students' gross motor abilities based on physical activity levels.
9	Suhartini et al.	2024	School-Age Children	Traditional Games-Based Learning	Traditional games enhance students' movement effectiveness in learning activities.
10	Siantoro et al.	2024	Grade 3–4 Elementary Students	Balance and Coordination	Students with good balance demonstrate higher physical activity levels.
11	Surya Fallo et al.	2024	Futsal Players	Motor Skills	Futsal training involves movements that improve coordination and agility.
12	Latifah & Fahri	2025	Elementary School Students	Volleyball Games	Volleyball games improve students' coordination skills.
13	Norman et al.	2025	Futsal Extracurricular Students	Explosive Power	A combination of jump rope and ladder drill exercises effectively improves explosive power.
14	Nuriati et al.	2025	Futsal Students	Agility	Training combinations contribute to improvements in futsal players' agility.
15	Setiawan, R.	2025	Elementary School Students	Fundamental Motor Skills	Sports-based learning activities improve students' basic motor skills..

The table shows that most national studies report a positive relationship between structured physical activity, including futsal extracurricular participation, and improvements in students' gross motor skills. Key components that are frequently reported to improve include speed, agility, coordination, balance, strength, and endurance.

Discussion

The findings of this national literature review consistently demonstrate that regular and structured physical activity plays a decisive role in enhancing students' gross motor skills, particularly among those who participate in futsal extracurricular activities. Differences in gross motor abilities between physically active and inactive students confirm that movement experience, rather than age alone, is a critical determinant of

motor development during childhood. This aligns with contemporary motor development theory, which emphasizes that repeated exposure to diverse and challenging movement tasks accelerates neuromuscular adaptation and motor learning processes (Gallahue et al., 2019; Wisudaningsih et al., 2025).

Students involved in futsal extracurricular activities consistently show superior performance in speed and agility compared to their non-participating peers. This advantage can be explained by the intrinsic characteristics of futsal, which demand frequent high-intensity sprints, rapid accelerations and decelerations, and sudden changes of direction. Such movement patterns stimulate fast-twitch muscle fibers and enhance neural firing efficiency, resulting in improved movement responsiveness and agility (Nurul Qomariah et al., 2022; Pratama et al., 2025). Empirical studies on team-based and invasion games similarly report that sports requiring rapid decision-making and explosive movement patterns significantly contribute to the development of motor agility in children (Adi et al., 2022; Surya Fallo et al., 2024).

From a neuromotor perspective, futsal provides task variability and contextual interference, two key factors known to facilitate motor skill acquisition. Unlike repetitive drills with predictable patterns, futsal presents constantly changing game situations that require students to adapt their movements in response to teammates, opponents, and ball trajectories. This condition enhances motor adaptability and transferability of skills to other physical activities (Sari, 2023; Yuliandra et al., 2023). Consequently, students who engage in futsal extracurricular programs tend to develop more refined and functional gross motor skills.

In terms of coordination and balance, the reviewed studies indicate that futsal participation fosters significant improvements compared to non-participation. Futsal requires continuous integration of visual perception, proprioceptive input, and motor execution, particularly during dribbling, passing, and shooting actions. These repetitive eye–foot coordination tasks strengthen sensorimotor integration and postural control, which are essential components of gross motor proficiency (Rida Satriawan et al., 2024; Siantoro et al., 2024). Previous research confirms that children who engage in ball games demonstrate superior dynamic balance and coordination compared to those who primarily engage in sedentary or low-intensity activities (Putranto & Efendi, 2024).

The improvement in balance observed among futsal participants is also attributable to frequent single-leg support phases, body feints, and rapid postural adjustments during gameplay. These movement demands challenge the vestibular and proprioceptive systems, thereby strengthening postural stability and movement control. This supports findings by Abduh et al. (2020) and Marsanda and Kurniawan (2023), who reported strong associations between balance ability, motor coordination, and overall physical fitness in school-aged children.

Beyond motor skill components, this review highlights that futsal extracurricular activities positively influence muscle strength and cardiorespiratory endurance, which in turn support gross motor performance. Regular futsal training involves repeated bouts of moderate-to-high intensity activity interspersed with brief recovery periods, resembling

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interval training patterns. Such physiological demands promote muscular strength, aerobic capacity, and fatigue resistance (Yulia Sari et al., 2024; Firdaus & Fadhli, 2025). Improved physical fitness enables students to perform motor tasks with greater efficiency, stability, and consistency, thereby enhancing overall movement quality.

The strong relationship between physical fitness and gross motor skills identified in this review reinforces existing empirical evidence that fitness components such as strength, endurance, and agility function as foundational supports for motor competence. Students with higher levels of physical fitness consistently demonstrate better locomotor and manipulative skills, as well as greater movement confidence (Humairah, 2024; Pasaribu et al., 2024). These findings further suggest that futsal extracurricular activities serve not only as skill-development platforms but also as effective means of improving students' general physical conditioning.

Importantly, this review situates futsal extracurricular activities within the broader context of limited PJOK instructional time in schools. Several studies emphasize that the restricted duration and high student–teacher ratios in formal physical education classes limit opportunities for individualized movement practice and adequate motor stimulation (Heni Widyaningsih, 2021; Sahabuddin, 2025). In this regard, futsal extracurricular programs function as a strategic extension of school-based physical education, offering additional structured movement experiences that compensate for curricular constraints (Zulia Syiva Salsabila & Rivan Saghita Pratama, 2024).

From an educational standpoint, the findings support the growing consensus that game-based sports represent an effective pedagogical approach for enhancing children's gross motor development. Game-based activities provide intrinsic motivation, social interaction, and meaningful movement contexts, which collectively enhance engagement and learning outcomes (Adi et al., 2022; Setyawan et al., 2023). Compared to non-game physical activities, futsal encourages sustained participation and repeated exposure to diverse movement challenges, thereby promoting long-term motor development.

Nevertheless, this review also identifies limitations within the existing literature. Most national studies employ cross-sectional or quasi-experimental designs with relatively small sample sizes, which may limit causal inference. In addition, variations in motor assessment instruments and training duration across studies complicate direct comparison of findings (Wisudaningsih et al., 2025). These limitations highlight the need for future research employing longitudinal and experimental designs to more precisely quantify the impact of futsal extracurricular participation on specific gross motor components.

Overall, the findings of this literature review substantiate the conclusion that futsal extracurricular activities are an effective and developmentally appropriate medium for enhancing students' gross motor skills. Participation in futsal is associated with superior speed, agility, coordination, balance, strength, and endurance compared to non-participation. These outcomes underscore the importance of integrating well-designed futsal extracurricular programs into school sport systems as a complementary strategy to formal physical education. By doing so, schools can better support students' physical growth, motor competence, and readiness for lifelong physical activity.

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CONCLUSION

Based on the review of various national journal articles, it can be concluded that there are differences in gross motor skills between students who participate in futsal extracurricular activities and those who do not participate in such activities. Students who actively engage in futsal extracurricular programs demonstrate better gross motor skills compared to students who do not join extracurricular activities.

These differences are evident across several components of gross motor skills, including speed, agility, coordination, balance, strength, and endurance. The dynamic nature of futsal, which involves rapid movements, sudden changes of direction, and coordination between visual perception and foot movements, provides effective stimulation for the gross motor development of school-aged students.

Therefore, futsal extracurricular activities can be considered a form of sports activity that contributes positively to the improvement of students' gross motor skills. Participation in futsal extracurricular programs complements Physical Education (PJOK) learning in schools and supports optimal physical development and physical fitness among students.

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