Fundamental Locomotor Skill Proficiency in Phase a Primary Students: An Observational Study of Walking, Running, and Jumping

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ABSTRACT

Purpose of the study: Fundamental locomotor skills—walking, running, and jumping—constitute the motor foundation upon which more complex physical competencies are developed during early childhood and primary school years. Adequate mastery of these skills is essential not only for physical performance but also for cognitive engagement, social participation, and lifelong physical activity habits. This study aimed to describe and assess the fundamental locomotor movement abilities of Phase A first-grade elementary school students, specifically examining walking, running, and jumping proficiency during Physical Education (PE) learning activities at SD Ibnu Halim, Medan, Indonesia.

Materials and methods: A qualitative descriptive research design was employed. Twelve students (6 males, 6 females; mean age 6.5 ± 0.5 years) were purposively selected as participants. Data were collected across three structured observation sessions using a validated locomotor skill observation rubric, supplemented by semi-structured teacher interviews and document analysis. Data were analyzed through thematic analysis comprising data reduction, data display, and conclusion drawing. Lincoln and Guba's trustworthiness criteria (credibility, transferability, dependability, and confirmability) were applied to ensure rigor.

Results: Walking demonstrated the highest proficiency rate (75.0%), characterized by consistent rhythmic gait and adequate dynamic balance. Running showed moderate proficiency (58.3%), with over 40% of participants displaying postural compensation and inconsistent arm–leg coordination. Jumping exhibited the lowest proficiency (33.3%), with the majority of students unable to execute proper two-foot takeoff mechanics and controlled landing techniques. Thematic analysis revealed four overarching themes influencing locomotor development: movement experience, pedagogical strategy, individual variation, and feedback quality.

Conclusions: Phase A first-grade students demonstrate locomotor abilities consistent with normative developmental expectations; however, significant refinement is required, particularly in jumping skills. Physical Education instruction should adopt game-based, exploratory, and differentiated approaches to optimize locomotor competency development. Teachers must provide structured guidance, timely corrective feedback, and sufficient practice opportunities aligned with each child's developmental stage.

Keywords
fundamental locomotor skills; walking; running; jumping; phase a; elementary school students; physical education; motor development.

INTRODUCTION

Fundamental locomotor skills (FLS) comprise a set of basic movement patterns—including walking, running, jumping, hopping, galloping, and skipping—that are considered the building blocks of physical literacy and motor competence across the lifespan (Gallahue et al., 2012; Khairani et al., 2025). Among these, walking, running, and jumping are particularly central to everyday physical functioning and serve as prerequisite competencies for participation in sport, recreational activities, and structured physical education programs. The early school years, specifically Grades 1 and 2 (Phase A in the Indonesian national curriculum), represent a critical window for FLS acquisition, as children between the ages of 6 and 8 are typically in the elementary or maturing stages of motor development (Clark & Metcalfe, 2002; Makaruk et al., 2023; Moon et al., 2024).

In Indonesia, the revised Kurikulum Merdeka curriculum designates Grade 1 (Phase A) as a foundational stage in which Physical Education (PE) teachers are expected to introduce and systematically develop gross motor skills through age-appropriate and play-oriented learning activities. However, research evidence suggests that formal instruction in basic movement skills at the elementary school level remains inconsistent, with many schools prioritizing sport-specific skills over the foundational locomotor competencies that underpin them (Lubans et al., 2010; Robinson et al., 2015). This misalignment between curricular intent and instructional practice has been identified as a contributing factor to widespread FLS deficits among school-aged children globally (Hardy et al., 2012).

Critical Examination of Existing Literature

A substantial body of international research has established the developmental and health significance of FLS proficiency

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in childhood. Lubans et al. (2010) conducted a systematic review demonstrating robust positive associations between FLS competence and physical activity participation, cardiorespiratory fitness, muscular strength, weight status, and psychosocial outcomes in children and adolescents. Similarly, Barnett et al. (2008) provided longitudinal evidence showing that motor skill proficiency in childhood is a significant predictor of adolescent physical activity levels, mediated through perceived physical competence and self-efficacy.

Stodden et al. (2008) proposed an influential developmental model emphasizing the dynamic, reciprocal relationship between motor competence and physical activity engagement. According to this model, children with higher FLS proficiency are more likely to engage in physical activity, which in turn further develops their motor capabilities, creating a positive developmental spiral. Conversely, children with poor motor competence are likely to withdraw from physical activities, forming a negative trajectory that can persist into adulthood. This theoretical perspective underscores the urgency of early identification and targeted intervention for children with FLS delays (Koolwijk et al., 2022).

With respect to locomotor skill development specifically, research indicates that the trajectory of walking, running, and jumping follows a predictable developmental progression, though the rate and quality of skill acquisition are substantially influenced by environmental factors including teaching quality, practice opportunities, and ecological affordances (Clark & Metcalfe, 2002; Gallahue et al., 2012; Logan et al. (2011) conducted a meta-analysis of motor skill intervention studies and found that structured PE programs incorporating skill-specific instruction, movement exploration, and game-based activities significantly accelerated FLS development compared to unstructured physical activity.

Identification of Research Gaps

Despite the breadth of international literature on FLS, context-specific research in Indonesian elementary school settings remains limited. Existing domestic studies (Fitriani & Rahayu, 2020; Sari & Wijayanto, 2021) have begun to address this gap but are largely descriptive in nature, lack standardized assessment protocols, and rarely examine the pedagogical dimensions that influence locomotor skill development. Furthermore, no study to date has specifically investigated Phase A locomotor skill proficiency at SD Ibnu Halim or comparable urban public elementary schools in North Sumatra, leaving teachers without locally validated baseline data to inform instructional planning.

There is also a paucity of qualitative research exploring teacher and student perspectives on FLS development in early PE, which limits the capacity for contextually sensitive program design. The present study addresses these gaps by applying a systematic observation protocol and thematic analysis to generate both descriptive and interpretive insights into Phase A locomotor skill development.

Rationale and Objectives

Given the critical importance of FLS in supporting lifelong physical activity and overall child development, and given the identified gap in context-specific research at Phase A level in Indonesia, this study was designed to provide a rigorous empirical baseline of locomotor skill proficiency at SD Ibnu Halim. Such baseline data are essential for informing teacher professional development, PE curriculum design, and targeted intervention planning.

The specific objectives of this study were: (1) to describe and assess the proficiency levels of walking, running, and jumping skills among Phase A Grade 1 students at SD Ibnu Halim; (2) to identify the key contextual and pedagogical factors influencing locomotor skill development in this population; and (3) to generate evidence-based recommendations for PE instructional practice in Phase A settings.

MATERIALS AND METHODS

Participants

A purposive sample of twelve (n = 12) Grade 1 students from SD Ibnu Halim, Medan, North Sumatra, Indonesia, participated in this study. The sample comprised six males and six females, with ages ranging from 6 to 7 years (mean age = 6.5 ± 0.5 years). All participants were enrolled in the same Phase A classroom and regularly attended PE lessons during the data collection period. Demographic and anthropometric characteristics of participants are summarized in Table 1.

Table 1. Participant Demographic and Anthropometric Characteristics (n = 12)

Code	Age (yrs)	Gender	Height (cm)	Weight (kg)
S1	6	Male	115.2	19.8
S2	6	Female	113.5	18.4
S3	7	Male	118.7	21.5
S4	7	Female	116.3	20.1
S5	6	Male	114.9	19.2
S6	6	Female	112.8	17.9
S7	7	Male	119.5	22.3
S8	7	Female	117.1	20.8
S9	6	Male	113.4	18.6
S10	6	Female	111.9	17.5
S11	7	Male	120.1	22.9
S12	7	Female	117.8	21.0
Mean ± SD	6.5 ± 0.5	6M / 6F	115.9 ± 2.7	20.0 ± 1.7

Note. Values are presented as mean ± standard deviation unless otherwise specified. M = Male; F = Female.

Study Organization

This study was conducted between January and March 2024 across three structured PE observation sessions, each lasting 70 minutes, corresponding to the standard PE lesson duration at SD Ibnu Halim. Sessions were held on the school's outdoor

multipurpose sports court. Each session was structured to include a 10-minute warm-up, a 45-minute main locomotor activity phase, and a 15-minute cool-down and reflection period.

The research utilized a qualitative descriptive design (Creswell & Poth, 2017), which was considered appropriate for the exploratory and contextually rich nature of the research questions. A qualitative approach enabled the researchers to capture nuanced movement quality indicators that are not adequately captured by quantitative scoring alone, while also allowing for the integration of teacher interview data and document analysis. A triangulation strategy was employed to enhance the validity of findings through the convergence of observational, interview, and documentary data sources.

Test and Measurement Procedures

Locomotor skill proficiency was assessed using a researcher-developed observation rubric adapted from the Test of Gross Motor Development, Second Edition TGMD-2 (Ulrich, 2000), a validated and widely used instrument for assessing fundamental motor skills in children aged 3–10 years. The rubric identified discrete movement criteria for each of the three locomotor skills assessed: walking (5 criteria: rhythmic step pattern, upright trunk posture, heel-to-toe foot contact, alternating arm swing, smooth weight transfer), running (5 criteria: momentary flight phase, foot contacts near ball of foot, non-support leg flexed, forward trunk lean, opposite arm-leg coordination), and jumping (5 criteria: preparatory knee bend, two-foot simultaneous takeoff, arm thrust, full body extension at peak, controlled bilateral landing).

Two trained raters independently scored each participant across all three sessions. Inter-rater reliability was assessed using Cohen's Kappa coefficient, yielding values of $\kappa = 0.84$ (walking), $\kappa = 0.81$ (running), and $\kappa = 0.78$ (jumping), all indicating strong agreement (Landis & Koch, 1977). For each skill, participants were classified as Proficient (meeting 4 or more of 5 criteria consistently across a session) or Developing (meeting fewer than 4 criteria). Video recordings were made of all sessions to enable post-hoc verification of ratings.

In addition, semi-structured interviews were conducted with the class PE teacher (duration: approximately 30 minutes per interview, two interviews total) to explore perceptions of student motor abilities, instructional challenges, and contextual factors affecting PE delivery. Document analysis encompassed the school's PE lesson plans, student report cards, and the national Phase A PE curriculum guidelines.

Data Analysis

Qualitative data analysis followed the framework proposed by Miles et al. (2014), comprising three iterative stages: (1) data reduction, in which raw observational field notes, interview transcripts, and documentary data were coded and condensed into meaningful units; (2) data display, in which coded data were organized into matrices and thematic frameworks to identify patterns and relationships; and (3) conclusion drawing and verification, in which interpretations were cross-checked against the full data corpus to ensure accuracy and coherence.

Observation frequency data (number and percentage of students achieving Proficient classification for each skill across sessions) were tabulated and presented descriptively. Inter-session consistency was examined by comparing proficiency rates across the three observation meetings. Thematic analysis of interview and documentary data yielded four major themes, which were subsequently triangulated with observational findings to generate integrated interpretations. All analyses were conducted using a manual coding approach, with ATLAS.ti (v.23) software used to organize and retrieve coded data segments.

Ethical Consideration

This study was conducted in full accordance with the ethical principles outlined in the Declaration of Helsinki (2013). Prior to data collection, written informed consent was obtained from the parents or legal guardians of all participating students. The school principal and classroom PE teacher provided institutional approval for the conduct of the study on school premises. Participants were fully informed of the voluntary nature of their participation and their right to withdraw at any time without consequence. All data were anonymized through the use of participant codes (S1–S12), and no personally identifiable information was retained in the research records. Video recordings used for inter-rater reliability purposes were stored on password-protected devices and deleted upon completion of data analysis. The research protocol received ethical clearance from the Research Ethics Committee of the Faculty of Sport Sciences, State University of Medan (Reference: UNIMED/SPE/2024/027).

RESULTS & DISCUSSION

Publication Trends

Walking Skill Proficiency:

Walking emerged as the most consistently demonstrated locomotor skill among Phase A students. Across the three observation sessions, 75.0% of participants (n = 9) achieved Proficient classification, reflecting stable performance of the majority of assessed criteria including rhythmic step patterns, upright trunk posture, and smooth weight transfer. The 25.0% classified as Developing (n = 3) primarily showed irregular stride length variability and minor lateral balance deviations, particularly when asked to alter walking direction or navigate a narrower track. No participant exhibited difficulties with basic forward locomotion on open flat surfaces.

Inter-session analysis revealed that walking proficiency remained stable from Meeting 1 to Meeting 3 (66.7% to 75.0%), with a modest improvement observed by the second session that was maintained thereafter. This stability is consistent with the well-established finding that walking, as the earliest developing locomotor pattern, reaches near-mature form by age 4–5 and requires limited formal instruction for further consolidation (Gallahue et al., 2012).

Running Skill Proficiency:

Running proficiency was classified at a moderate level, with 58.3% of participants (n = 7) achieving Proficient classification by the third observation session. The remaining 41.7% (n = 5) were classified as Developing, exhibiting observable deficiencies

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primarily in three areas: (i) absence of a clear momentary flight phase, with many students producing a shuffle-like contact pattern; (ii) excessive forward trunk lean as a compensatory strategy for speed generation; and (iii) inconsistent opposite arm–leg coordination, particularly during sustained running over longer distances.

A notable finding was the age-related difference in running proficiency: students aged 7 years demonstrated higher proficiency rates (71.4% Proficient, n = 5/7) compared to 6-year-olds (40.0% Proficient, n = 2/5). This differential suggests that the one-year age gap within the Phase A cohort is associated with meaningful differences in running maturity, consistent with the developmental literature on the progression of running mechanics during the 6–8 year age range (Clark & Metcalfe, 2002).

Jumping Skill Proficiency:

Jumping demonstrated the lowest proficiency rate across all assessed locomotor skills. Only 33.3% of participants (n = 4) achieved Proficient classification by the third observation session, indicating that the majority of students had not yet consolidated the discrete motor components necessary for mature jumping performance. The most commonly observed skill limitations included: (i) inability to execute a controlled preparatory knee flexion prior to takeoff; (ii) asymmetric or staggered foot departure during the two-foot takeoff phase; (iii) minimal use of arm drive during the flight phase; and (iv) rigid knee extension and loss of balance on landing, with several participants falling backward post-jump. Qualitative field notes documented that students showed heightened anxiety when asked to perform jumping tasks involving even modest vertical or horizontal distances, suggesting that affective and motivational factors may compound the mechanical skill deficits observed. These findings are presented in summary in Tables 2 and 3.

Table 2. Locomotor Skill Proficiency Classification by Observation Criteria and Frequency (n = 12)

Skill	Observed Criteria	Proficiency Level	Frequency (n = 12)
Walking	Rhythmic step pattern; upright posture; heel-to-toe contact	Proficient	9 (75%)
Walking	Irregular stride length; minor balance deviation	Developing	3 (25%)
Running	Coordinated arm–leg swing; forward lean; continuous stride	Proficient	7 (58.3%)
Running	Shortened stride; poor postural control; inconsistent speed	Developing	5 (41.7%)
Jumping	Two-foot takeoff; forward reach; controlled landing	Proficient	4 (33.3%)
Jumping	Rigid knee on landing; loss of balance; inadequate push-off	Developing	8 (66.7%)

Note. Proficiency levels defined as Proficient (≥4 of 5 criteria met) or Developing (<4 of 5 criteria met).

Table 3. Locomotor Skill Proficiency Rates Across Three Observation Sessions (n = 12)

Locomotor Skill	Meeting 1 Proficient (%)	Meeting 2 Proficient (%)	Meeting 3 Proficient (%)
Walking	66.7%	75.0%	75.0%
Running	50.0%	58.3%	58.3%
Jumping	25.0%	33.3%	33.3%
Overall	47.2%	55.6%	55.6%

Note. Values represent the percentage of participants classified as Proficient during each session.

Thematic Analysis of Contextual and Pedagogical Factors

Thematic analysis of teacher interview transcripts and documentary data identified four primary themes influencing locomotor skill development in the Phase A classroom context (see Table 4).

Table 4. Themes and Sub-themes Emerging from Thematic Analysis of Interview and Documentary Data

Theme	Sub-theme	Supporting Evidence
Movement Experience	Limited prior exposure to structured PE	Interview data; teacher observation notes
Pedagogical Strategy	Repetitive drills without game integration	Lesson plan review; documentation
Individual Variation	Age-related difference (6 vs 7 yrs)	Observation: 7-yr-olds showed higher proficiency
Feedback Quality	Infrequent corrective feedback during tasks	Classroom observation records

Note. Themes were derived through iterative open and axial coding of interview transcripts and field notes.

The theme of Movement Experience was prominent, with the PE teacher reporting that many students had limited structured movement opportunities prior to formal schooling, particularly in terms of guided locomotor play. Pedagogical Strategy concerns centered on the predominance of repetitive, drill-based instruction without meaningful game integration, which the teacher acknowledged as potentially limiting engagement and skill transfer. Individual Variation emerged as a salient theme, with observable differences in proficiency linked to chronological age (6 vs. 7 years) and, to a lesser extent, to reported physical activity levels at home. Finally, Feedback Quality was identified as a constraining factor: teacher observations confirmed that corrective feedback was infrequently delivered during locomotor activities, reducing opportunities for students to self-regulate and refine movement technique in real time.

DISCUSSION

Interpretation of Locomotor Skill Outcomes

The findings of the present study are broadly consistent with international normative data on FLS development in early childhood. The hierarchical pattern of skill proficiency observed—walking > running > jumping—reflects the well-documented ontogenetic order of locomotor acquisition, wherein skills demanding greater muscular strength, balance, and neuromuscular coordination emerge later in development and are more sensitive to instructional and environmental influences (Ahmad et al., 2025; Gallahue et al., 2012). The 75.0% walking proficiency rate aligns with expectations for the 6–7 year age range, as walking typically achieves mature form by kindergarten age. However, the relatively lower running (58.3%) and jumping (33.3%) proficiency rates indicate that a substantial proportion of Phase A students at SD Ibnu Halim have not yet reached the mature phase of these skills, suggesting a need for targeted instructional intervention (Abdullah et al., 2016).

Comparison with Prior Research

The running proficiency results are partially consistent with those reported by Sari & Wijayanto (2021), who found that early-grade elementary students demonstrated gradual, incremental improvements in arm–leg coordination during running as a function of age and motor practice. The present study's finding of a notable difference in running proficiency between 6- and 7-year-olds (40.0% vs. 71.4% Proficient) corroborates this developmental gradient and aligns with Clark & Metcalfe (2002) mountain metaphor of motor development, which positions the late preschool to early primary school years as a period of rapid locomotor skill diversification. The low jumping proficiency rate (33.3%) is consistent with international research indicating that two-foot jumping, particularly with emphasis on coordinated takeoff mechanics and controlled landing, is among the most challenging FLS for children in the 6–7 age group to master (Hardy et al., 2012; Logan et al., 2011). Hidayat & Komarudin (2019) similarly reported that jumping requires the integration of lower-limb strength, balance, and body awareness that develops more gradually than other locomotor skills. The present findings add contextual specificity to these international results by documenting the particular technical deficiencies (asymmetric takeoff, rigid landing knee) most prevalent in this population.

Role of Pedagogical Factors

The thematic analysis findings have important implications for understanding why jumping proficiency in particular remains underdeveloped. The identification of limited game integration in PE instruction aligns with the meta-analytic evidence provided by (Logan et al., 2011), who demonstrated that game-based and exploratory motor learning contexts are significantly more effective for FLS development than drill-based approaches. This is consistent with ecological dynamics theory Araújo & Davids (2011), which holds that movement skill acquisition is optimized when practice contexts closely replicate the affordance structures of real-world movement environments.

Fitriani & Rahayu (2020) noted that walking and running patterns develop rapidly through daily life exposure, while jumping requires deliberate, targeted practice that is often absent from unstructured free play. This distinction may explain the relatively high walking proficiency and lower jumping proficiency observed in the present study. The PE teacher's acknowledgment of infrequent corrective feedback further compounds this concern, as research consistently demonstrates that augmented feedback—particularly knowledge of performance regarding movement technique—is essential for refining discrete skill components in novice movers (Atatekin & Kara, 2023; Schmidt & Wrisberg, 2008).

Individual Variation and Developmental Considerations

The age-related variation in proficiency observed between 6- and 7-year-old participants is noteworthy from a developmental perspective. While both cohorts fall within the normative Phase A age range, the one-year difference in chronological age appears to confer meaningful advantages in motor coordination, postural control, and movement confidence(Hyfte et al., 2022; Russo et al., 2024). This finding has direct practical implications for differentiated instruction in mixed-age PE classes, suggesting that teachers should account for intra-class developmental heterogeneity when designing locomotor skill learning tasks. Stodden et al. (2008) emphasized that children's perceived motor competence, which is strongly influenced by early success experiences in PE, is a critical mediator of long-term physical activity engagement. Differentiated and scaffolded PE tasks that ensure all students experience movement success are therefore a pedagogical priority.

Limitations

Several limitations of the present study should be acknowledged. First, the small and purposive sample (n = 12 from a single school) constrains the generalizability of findings to other Phase A contexts in Indonesia or internationally. Future research should employ larger, multi-school samples to enable more robust comparisons. Second, the study's cross-sectional design precludes causal inferences regarding the factors driving observed proficiency levels; longitudinal designs would be better positioned to examine developmental trajectories. Third, while the observation rubric was adapted from the validated TGMD-2, the modified version used in this study has not been independently validated in the Indonesian cultural context. Fourth, the absence of quantitative anthropometric or fitness measures limits the interpretation of between-student variation. These limitations notwithstanding, the study's triangulated qualitative design and attention to contextual factors provide a nuanced and internally valid account of Phase A locomotor skill development at SD Ibnu Halim.

CONCLUSION

This study assessed fundamental locomotor skills—walking, running, and jumping—among Phase A Grade 1 students at SD Ibnu Halim, Medan, Indonesia. The findings provide empirical confirmation that Phase A students' locomotor abilities are broadly aligned with normative developmental expectations for the 6–7 year age range; however, significant between-student variation and a notably low jumping proficiency rate (33.3%) signal that a considerable proportion of students have not yet achieved the mature movement patterns necessary for safe, competent, and enjoyable participation in physical activities.

Walking was the most proficiently demonstrated skill (75.0%), reflecting its status as the earliest-emerging and most environmentally reinforced locomotor pattern. Running proficiency was moderate (58.3%), with technical deficiencies in arm–leg coordination and postural control particularly evident among 6-year-old participants. Jumping proficiency was lowest (33.3%), with inadequate takeoff mechanics and uncontrolled landing technique identified as the most prevalent deficiencies requiring instructional attention.

The evidence from this study collectively supports the conclusion that locomotor skill development in Phase A is significantly modulated by the quality and diversity of PE instruction, the frequency and specificity of teacher feedback, and the availability of varied movement experiences both within and outside the school setting. These findings corroborate international theoretical models (Gallahue et al., 2012; Stodden et al., 2008) linking early motor skill proficiency to lifelong physical activity trajectories, and reinforce the urgency of investing in high-quality early PE as a public health priority.

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Based on these findings, the authors offer the following recommendations: (1) PE teachers in Phase A settings should incorporate structured, game-based locomotor activities into every lesson, with a particular emphasis on jumping tasks embedded within low-risk, enjoyable movement challenges; (2) differentiated instruction strategies should be systematically implemented to address the developmental heterogeneity observed within Phase A classrooms; (3) school PE programs should establish baseline locomotor skill assessments at the start of Grade 1 to identify students in need of early support; and (4) pre-service and in-service PE teacher education programs should prioritize training in fundamental motor skill pedagogy, including the principles of augmented feedback, task modification, and ecological approach instructional design. Future research should examine the efficacy of structured locomotor skill intervention programs in Phase A Indonesian settings, with particular attention to jumping skill development and the role of teacher-student interaction quality.

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CONFLICT OF INTEREST

The authors declare no conflict of interest. The research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

REFERENCES

Abdullah, B., Joseph, J., Binti, M., & Saleh, M. (2016). *Journal of Physical Education and Sport*, *2016*. https://doi.org/10.7752/jpes.2016.s1114

Ahmad, N. Y., Noviansyah, A., Ginting, R., Manalu, M. V. Y., Gomagel, Y., Surbakti, S., & Zai, R. Y. Z. R. Y. (2025). Associations Between Daily Physical Activity and Motor Skill Competence Among Preschool Children. *Journal of Foundational Learning and Child Development*, *1*(2), 99. https://doi.org/10.53905/childdev.v1i02.15

Araújo, D., & Davids, K. (2011). What exactly is acquired during skill acquisition. *Shura (Sheffield Hallam University Research Archive) (Sheffield Hallam University)*.

Atatekin, B., & Kara, M. (2023). The impact of augmented video feedback on middle school students' skill development in physical education. *Education and Information Technologies*, *29*(1), 843. https://doi.org/10.1007/s10639-023-12335-x

Barnett, L. M., Beurden, E. van, Morgan, P. J., Brooks, L., & Beard, J. (2008). Childhood Motor Skill Proficiency as a Predictor of Adolescent Physical Activity. *Journal of Adolescent Health*, *44*(3), 252. https://doi.org/10.1016/j.jadohealth.2008.07.004

Clark, J. E., & Metcalfe, J. S. (2002). The mountain of motor development: A metaphor. In *Motor development: Research and reviews* (Vol. 2, p. 163). National Association for Sport and Physical Education.

Creswell, J. W., & Poth, C. (2017). *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*. http://bvbr.bib-bvb.de:8991/F?func=service&doc_library=BVB01&doc_number=015659534&line_number=0001&func_code=DB_RECORDS&service_type=MEDIA

Fitriani, L., & Rahayu, S. (2020). Development of locomotor movement patterns in elementary school-aged children. *Jurnal Pendidikan Jasmani Dan Olahraga*, *5*(2), 99. https://doi.org/10.17509/jpjo.v5i2.25148

Gallahue, D. L., Ozmun, J. C., & Goodway, J. D. (2012). *Understanding motor development: Infants, children, adolescents, adults*. McGraw-Hill.

Hardy, L. L., Reinten-Reynolds, T., Espinel, P., Zask, A., & Okely, A. D. (2012). Prevalence and Correlates of Low Fundamental Movement Skill Competency in Children. *PEDIATRICS*, *130*(2). https://doi.org/10.1542/peds.2012-0345

Hidayat, R., & Komarudin. (2019). Analysis of basic movement abilities of elementary school students. *Jurnal Keolahragaan*, 7(2), 112. https://doi.org/10.21831/jk.v7i2.28174

Hyfte, E. van, Vercruysse, S., Warlop, G., & Lenoir, M. (2022). A Physical Education Program Based Upon an Obstacle Course Positively Affects Motor Competence in 6- to 7-Year-Old Children: A Pilot Study. *Journal of Teaching in Physical Education*, *41*(4), 610. https://doi.org/10.1123/jtpe.2021-0065

Khairani, K., Ungerer, L. V., & Helmi, B. (2025). Stimulating Gross Motor Skills In Deaf-Mute Children In A Special Needs Elementary School Via Games. *Journal of Foundational Learning and Child Development*, *1*(2), 42. https://doi.org/10.53905/childdev.v1i02.8

Koolwijk, P., Pim, P., Witte, A. D., Remo, R., Teun, T., Dave, D., Aart, I. van, Geert, G., Sanne, S., Witte, A. D., Mombarg, R., Remmers, T., Kann, D. van, Savelsbergh, G. J. P., Vries, S. I. de, Witte, A. D., Witte, A. D., Witte, A. D., Witte, A. D., … Witte, A. D. (2022). *Journal of Physical Education and Sport*, *22*(6). https://doi.org/10.7752/jpes.2022.06185

Landis, J. R., & Koch, G. G. (1977). The Measurement of Observer Agreement for Categorical Data. *Biometrics*, *33*(1), 159. https://doi.org/10.2307/2529310

Logan, S. W., Robinson, L. E., Wilson, A. E., & Lucas, B. (2011). Getting the fundamentals of movement: a meta-analysis of the effectiveness of motor skill interventions in children. *Child Care Health and Development*, *38*(3), 305. https://doi.org/10.1111/j.1365-2214.2011.01307.x

Lubans, D. R., Morgan, P. J., Cliff, D. P., Barnett, L. M., & Okely, A. D. (2010). Fundamental Movement Skills in Children and

DOI: 10.53905/ChildDev.v2i01.06

Fundamental Locomotor Skill Proficiency in Phase a Primary Students: An Observational Study of Walking, Running, and Jumping.

Adolescents. *Sports Medicine*, *40*(12), 1019. https://doi.org/10.2165/11536850-000000000-00000

Makaruk, H., Grants, J., Bodasińska, A., Bula-Biteniece, I., Zieliński, J., Dravniece, I., Starzak, M., Ciekurs, K., Piech, K., Makaruk, B., Žīdens, J., Kalniņš, K., & Sadowski, J. (2023). Exploring Cross-Cultural Differences in Fundamental Motor Skills Proficiency Between Polish and Latvian Children. *Polish Journal of Sport and Tourism*, *30*(3), 12. https://doi.org/10.2478/pjst-2023-0014

Moon, J., Webster, C. A., Stodden, D. F., Brian, A., Mulvey, K. L., Beets, M. W., Egan, C. A., McIntosh, L. I. F., Merica, C. B., & Russ, L. (2024). Systematic review and meta-analysis of physical activity interventions to increase elementary children's motor competence: a comprehensive school physical activity program perspective [Review of *Systematic review and meta-analysis of physical activity interventions to increase elementary children's motor competence: a comprehensive school physical activity program perspective*]. *BMC Public Health*, *24*(1), 826. BioMed Central. https://doi.org/10.1186/s12889-024-18145-1

Robinson, L. E., Stodden, D. F., Barnett, L. M., Lopes, V. P., Logan, S. W., Rodrigues, L. P., & D'Hondt, E. (2015). Motor Competence and its Effect on Positive Developmental Trajectories of Health. *Sports Medicine*, *45*(9), 1273. https://doi.org/10.1007/s40279-015-0351-6

Russo, L., Micozzi, M. S., Racil, G., Larion, A., Lupu, E., Padulo, J., & Migliaccio, G. M. (2024). Decoding Motor Skills: Video Analysis Unveils Age-Specific Patterns in Childhood and Adolescent Movement. *Children*, *11*(11), 1351. https://doi.org/10.3390/children11111351

Sari, M., & Wijayanto, D. (2021). Development of fundamental movement in elementary school students: A study of locomotor and non-locomotor abilities. *Jurnal Ilmu Keolahragaan*, *20*(1), 78. https://doi.org/10.24114/jik.v20i1.22971

Schmidt, R. A., & Wrisberg, C. A. (2008). *Motor learning and performance: A situation-based learning approach, 4th ed.* https://psycnet.apa.org/record/2008-01581-000

Stodden, D. F., Goodway, J. D., Langendorfer, S. J., Roberton, M. A., Rudisill, M. E., García, C., & García, L. E. V. (2008). A Developmental Perspective on the Role of Motor Skill Competence in Physical Activity: An Emergent Relationship. *Quest*, *60*(2), 290. https://doi.org/10.1080/00336297.2008.10483582

World Medical Association. (2013). World Medical Association Declaration of Helsinki: Ethical principles for medical research involving human subjects. *JAMA*, *310*(20), 2191. https://doi.org/10.1001/jama.2013.281053