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Gender-Specific Motor Skill Development Among Preschool Girls: A Pilot Study

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ABSTRACT

Motor skill development is a fundamental aspect of early childhood, shaping physical, cognitive, and social growth. This pilot study investigates the gross motor skill proficiency of 60 preschool girls aged 3–5 years in the Ratnapura District, Sri Lanka. Using the Test of Gross Motor Development, Second Edition (TGMD-2), both locomotor skills (e.g., running, hopping) and object control skills (e.g., throwing, catching) were assessed. Results indicate that 76% of participants performed at "Average" or "Above Average" levels in locomotor skills, while 42% fell into the "Below Average" category for object control skills. Moderate correlations were found between physical attributes (height and weight) and motor performance. The findings underscore the need for gender-sensitive, skill-specific interventions in early childhood education, particularly to enhance object control skills. This study provides evidence-based insights to inform curriculum development, teacher training, and educational policy aimed at promoting balanced motor development in preschool settings.

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1. INTRODUCTION

Gross motor skills form a foundational component of early childhood development, contributing not only to physical activity and coordination but also to cognitive growth, self-regulation, and social interaction. These skills (divided into locomotor (e.g., running, hopping, jumping) and object control (e.g., throwing, catching, kicking)) are critical during the preschool years, a period marked by rapid neuromuscular and behavioral development. Research shows that motor skill competence in early childhood is a strong predictor of long-term physical activity, academic performance, and psychological well-being (Barnett *et al*., 2008; Robinson *et al*., 2016; Rahayu & Ismail, 2023; Samson & Agboola, 2022;). However, studies also suggest that gender differences in motor skill development begin to emerge during the preschool period. Girls often demonstrate higher proficiency in locomotor skills, while boys tend to perform better in object control tasks (Chow & Louie, 2013; Ma & Luo, 2023).

These trends may reflect both biological predispositions and socio-cultural influences, including the types of play and physical activity, typically encouraged for each gender (Ecevit & Şahin, 2021; Matarma *et al*., 2020; Francis *et al*., 2023; Demalata *et al*., 2024; Mulyahati & Rasiban, 2021; Boriongan & Abdulmalic, 2023; Pranathi & Kamraju, 2024; Demalata *et al*., 2024; Situngkir *et al*., 2024). In Sri Lanka, research on gender-specific motor development in early childhood remains limited. There is a pressing need for localized evidence to inform curriculum development, teacher training, and early interventions that address motor skill disparities.

The Test of Gross Motor Development, Second Edition (TGMD-2) offers a standardized method to evaluate these skills, allowing researchers to identify strengths and areas for improvement in young children's physical development. This pilot study focused on preschool girls aged 3–5 years in the Ratnapura District, aiming to fill a critical research gap by assessing their gross motor skill proficiency using TGMD-2. The specific objectives of this study are to:

(i) Evaluate locomotor and object control skills using a standardized assessment;
(ii) Identify developmental gaps, particularly in object control proficiency;
(iii) Examine the relationship between physical attributes (height and weight) and motor skill performance;
(iv) Inform curriculum development
(v) Provide evidence-based recommendations for early childhood educators and policymakers to support gender-sensitive motor skill development.

By highlighting gender-specific trends and challenges in motor skill acquisition, this study aims to inform inclusive educational practices and contribute to the formulation of early childhood physical education programs that support balanced and equitable development. The study seeks to contribute to educational policies and practices by offering actionable insights into motor skill development for preschool girls. This will support early interventions and structured physical activities to ensure balanced development.

2. METHODS

This study employed a quantitative, cross-sectional pilot design to evaluate gross motor skill development among preschool girls aged 3–5 years in the Ratnapura District, Sri Lanka. The focus was on identifying current levels of locomotor and object control skill proficiency, as well as examining the relationship between physical attributes and motor performance. A total of 60 preschool girls were selected using purposive sampling from government-registered preschools in Ratnapura. The inclusion criteria required participants to be within

the 3–5-year age range, without diagnosed developmental delays or physical disabilities. Informed consent was obtained from the parents or guardians of all participants prior to data collection.

Motor skill proficiency was assessed using the TGMD-2, a standardized and widely validated tool for evaluating fundamental motor skills in young children. The TGMD-2 comprises:

(i) Locomotor skills: running, galloping, hopping, leaping, horizontal jumping, and sliding.
(ii) Object control skills: striking, dribbling, catching, kicking, overhand throwing, and underhand rolling.

Each skill is evaluated through performance criteria scored during direct observation, providing both raw scores and percentile rankings. The data collection process spanned two weeks:

(i) In Week 1, trained assessors administered the TGMD-2 individually in a controlled environment (e.g., preschool play area or indoor hall). Each child was given two trials per skill, following TGMD-2 protocol.
(ii) In Week 2, follow-up structured observations were conducted to validate initial assessments and ensure consistency across scorers. Observers used standardized scoring sheets and followed identical instructions to reduce inter-rater variability.

Anthropometric data (height and weight) were also measured using calibrated equipment to calculate BMI and analyze correlations with motor skill proficiency. Collected data were analyzed using descriptive and inferential statistical methods:

(i) Descriptive statistics (frequencies and percentages) were used to categorize performance levels based on TGMD-2 norms (Very Poor, Poor, Below Average, Average, Above Average, Superior, Very Superior).
(ii) Pearson correlation coefficients were calculated to determine relationships between physical attributes (height and weight) and gross motor skill scores.

3. RESULTS AND DISCUSSION

The study assessed the gross motor skills of 60 preschool girls aged 3-5 years using TGMD-2, focusing on locomotor and object control skills. The findings are presented in **Table 1**.

Table 1. Summary of gross motor skill performance.

Skill Type	Above Average (%)	Average (%)	Below Average (%)
Locomotor Skills	46%	30%	24%
Object Control Skills	25%	33%	42%

A significant majority (76%) of participants performed within the "Above Average" or "Average" categories in locomotor skills. Girls exhibited strengths in running, hopping, and jumping, reflecting natural coordination and movement efficiency.

However, 24% scored "Below Average," indicating a need for interventions to improve specific skills like galloping and sliding. Performance in object control skills was more variable. Only 25% achieved "Above Average" ratings, while 42% were classified as "Below Average." Skills such as catching and throwing posed particular challenges, likely due to limited exposure to structured physical activities focusing on these tasks. Pearson correlation analysis revealed moderate positive correlations between height, weight, and motor skill performance ($r = 0.45$ for locomotor skills; $r = 0.37$ for object control skills).

Taller and heavier children showed slightly better proficiency, suggesting that physical growth supports motor skill acquisition. The results highlight a clear strength in locomotor skills among preschool girls, aligning with existing research that girls often excel in movement-based tasks during early childhood. Object control skills, however, represent an area needing significant attention. Limited opportunities for structured training in preschool settings may contribute to these gaps. Results align with existing literature emphasizing locomotor dominance in girls.

However, challenges in object control skills suggest the need for targeted interventions. Tailored physical education programs focusing on skill-specific training can bridge this gap. This pilot study provides a focused analysis of gender-specific gross motor skill development among preschool girls in Sri Lanka, revealing both strengths and areas for improvement. A notable outcome is the relatively high performance in locomotor skills, where 76% of the participants scored in the "Above Average" or "Average" categories. This supports prior findings that girls tend to excel in locomotor activities, particularly those requiring coordinated body movements such as running, hopping, and jumping (Roscoe *et al*., 2019; Ma & Luo, 2023).

In contrast, object control skills emerged as an area of concern, with 42% of the girls classified as "Below Average." Tasks such as throwing, catching, and striking were notably less developed, echoing global trends that consistently show boys outperforming girls in object manipulation tasks (Chow & Louie, 2013; Robinson *et al*., 2015; Ma & Luo, 2023). These disparities are often attributed not only to physiological factors but also to socio-cultural influences, where girls may receive fewer opportunities to engage in structured activities that promote these skills (Matarma *et al*., 2020; Ecevit & Şahin, 2021).

Interestingly, while some studies confirm a female advantage in locomotor skills, others suggest that such differences may not be statistically significant, emphasizing the role of contextual variables such as environment, parental support, and access to physical space (Ecevit & Şahin, 2021; Ma & Luo, 2023).

This highlights that gender disparities in motor skills are not solely biologically driven but shaped by interactions between children and their physical and social environments. Structured physical education (PE) programs in early childhood have been shown to mitigate these disparities by improving fundamental motor skills across domains. Several studies affirm that structured, teacher-led programs significantly enhance object control skills (Friskawati, 2023; Capio & Eguia, 2021; Navarra *et al*., 2022). These programs not only promote technical skill development but also foster confidence and sustained participation in physical activity (Barnett *et al*., 2008; Zeng et al., 2017). Structured PE leads to broad developmental gains, including cognitive and socio-emotional benefits (Battaglia *et al*. (2019), emphasized the importance of guided practice and feedback in skill acquisition (Robinson *et al*., 2016).

The moderate correlations observed between physical attributes—such as height and weight—and motor skill proficiency ($r = 0.45$ for locomotor; $r = 0.37$ for object control) suggest a supportive role of physical growth. However, physical attributes alone do not fully account for performance variations. Research indicates that children with healthy weight status typically demonstrate better motor competence than their overweight peers, and higher BMI tends to negatively affect skills requiring agility and coordination (Aleksić-Veljković *et al*., 2021; D'Hondt *et al*., 2011; Wick *et al*., 2017). Furthermore, children's perceived competence and physical activity levels act as mediators between body composition and motor skills (Lopes *et al*., 2016).

Marmeleira *et al*. (2017) note that the negative impact of BMI increases with age, suggesting the urgency of early interventions, while Temple *et al*. (2014) argue that improved motor skills can themselves predict higher levels of physical activity—indicating a bidirectional relationship between body composition and motor competence. From an educational and policy perspective, these findings underscore the need for gender-sensitive, skill-specific curricula in early childhood education. Preschool programs should provide equitable opportunities to engage in both locomotor and object control activities through structured, developmentally appropriate play. Additionally, teacher education programs should incorporate motor development content to help educators assess, plan, and facilitate inclusive and effective movement-based learning experiences. Ultimately, this study adds to the growing literature advocating for holistic and inclusive approaches to motor skill development in early childhood. Addressing gaps in object control skills through structured, contextually relevant programs can not only improve physical proficiency among girls but also contribute to broader developmental outcomes including social engagement, cognitive growth, and long-term health.

4. CONCLUSION

This pilot study examined the gross motor skill development of preschool girls aged 3–5 in the Ratnapura District, Sri Lanka, with a focus on locomotor and object control proficiency. The findings reveal a clear strength in locomotor skills, where a majority of participants performed within the “Above Average” or “Average” range. In contrast, object control skills were underdeveloped, with a substantial portion of participants scoring “Below Average.” This imbalance reflects broader gender-based trends and highlights the potential influence of environmental and socio-cultural factors on motor skill acquisition. Moderate positive correlations between physical attributes (height and weight) and motor skill proficiency suggest that physical growth contributes to performance, but is not the sole determinant. Access to structured physical activity, targeted instruction, and practice opportunities play equally critical roles in shaping motor competence.

The study underscores the importance of implementing gender-sensitive and skill-specific interventions in early childhood education settings. Integrating object control activities into preschool curricula, enhancing teacher training on motor development, and promoting inclusive play environments can bridge existing developmental gaps. Additionally, policy-level attention to physical literacy benchmarks and motor skill assessment in early education can contribute to more holistic, equitable learning outcomes. As a foundational step toward a broader national understanding, this research provides evidence-based insights to inform early interventions and curriculum design. Future studies with larger, more diverse samples across regions and genders are recommended to deepen understanding and support the development of well-rounded physical education programs for young children.

5. AUTHORS’ NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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