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Original Article

SEM Analysis of Fundamental Motor Skill Proficiency, Physical Activity Intensity, Enjoyment, and Competence Perception in Children's Motor Development

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Abstract

Introduction: Fundamental motor skills (FMS) and physical activity (PA) are critical determinants of motor development in children. Psychosocial factors such as enjoyment and perceived competence may mediate these relationships, yet few studies have examined these pathways simultaneously using structural equation modeling (SEM).
Objective: This study aimed to investigate direct and indirect associations among FMS proficiency, PA intensity, enjoyment of PA, perceived competence, and motor development in children aged 6–10 years.
Methods: A cross-sectional study was conducted with 262 children (136 boys, 126 girls). Standard tools were used for measuring research variables. SEM was employed to test direct and indirect pathways among variables. Model fit was evaluated using χ^2/df, CFI, TLI, RMSEA, and SRMR.
Results: FMS proficiency and PA intensity significantly predicted motor development directly (β=0.44 and 0.31, $p<0.001$, respectively). Enjoyment and perceived competence partially mediated these relationships, with significant indirect effects ($p<0.01$). The final SEM model demonstrated excellent fit (χ^2/df=2.15, CFI=0.968, TLI=0.961, RMSEA=0.049, SRMR=0.043).
Conclusion: Motor development in children is influenced by both behavioral factors (FMS and PA) and psychosocial mediators (enjoyment, perceived competence). Interventions that integrate skill practice, PA, and motivational elements may enhance motor competence and support lifelong engagement in PA.

Keywords: Motor Skills, Child, Physical Activity, Structural Equation Modeling, Psychosocial Factors

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1. Introduction

Motor development in childhood is a crucial element of human growth, involving the advancement of fundamental motor skills (FMS) such as locomotor, object-control, and stability skills. These foundational skills are essential for executing more complex movements and play a vital role in engaging in organized sports, recreational activities, and everyday tasks (1,2). Research indicates that effective motor skill development during early and middle childhood is closely associated with increased physical activity (PA) levels, enhanced cardiovascular and musculoskeletal health, and improved psychosocial well-being (3,4). In contrast, delays or inadequacies in FMS can result in lower participation in physical activities, fostering sedentary lifestyles, obesity, and diminished fitness, which can perpetuate a negative cycle of development. Thus, it is essential to comprehend the various factors influencing motor development to create effective intervention strategies (5).

PA intensity is a crucial factor influencing the development of FMS in children. Research indicates that those who participate in higher levels of moderate-to-vigorous PA (MVPA) show significantly greater improvements in FMS proficiency than their peers engaged in primarily low-intensity activities (6-8). The effectiveness of motor skill acquisition is closely linked to both the quantity and quality of movement experiences, where repetitive practice and exposure to diverse movement challenges play vital roles. Structured activities, such as obstacle courses and sport-specific drills, offer high-intensity, skill-oriented opportunities that promote neural and muscular adaptations, thereby enhancing coordination and motor control (9,10). Conversely, while unstructured play may involve lower intensity, it fosters creativity, adaptability, and the organic development of balance, agility, and coordination (11). Thus, a comprehensive understanding of the relationship between PA intensity and FMS development necessitates consideration of not only the duration but also the type and level of engagement in physical activities.

A significant factor influencing motor development is the enjoyment of PA. This enjoyment reflects a child's intrinsic motivation and emotional engagement with movement. Research shows that children who find PA enjoyable are more likely to participate regularly, gain more exposure to PA, and develop skills more rapidly

(12,13). Enjoyment acts as a psychosocial mediator, facilitating the conversion of practice opportunities into actual skill enhancement. Studies involving preschool and primary school children have demonstrated a positive correlation between enjoyment, PA levels, FMS competence, and long-term commitment to active lifestyles (14). Therefore, interventions aimed solely at increasing activity levels may be ineffective if they overlook the emotional aspect; children are less likely to remain engaged in activities they do not find enjoyable. Consequently, fostering enjoyment is essential for promoting motor development, as it enhances voluntary participation, encourages persistence, and creates an environment conducive to skill mastery.

Perceived competence, which refers to a child's self-evaluation of their ability to execute motor tasks, is a crucial psychosocial element. Harter's competence motivation theory (1978) posits that children who view themselves as more capable are likely to engage more actively in challenging activities, demonstrate greater persistence when faced with obstacles, and seek out additional practice opportunities (15,16). This self-assessment becomes particularly significant during middle childhood, a period marked by increased peer comparison and the development of self-evaluative skills. Research indicates that children with low perceived competence may withdraw from active play, shy away from difficult tasks, and exhibit reduced motivation to refine their motor skills, which can hinder their overall motor development (17-19). In contrast, fostering a sense of perceived competence through targeted feedback, structured learning environments, and mastery-oriented instruction can establish a beneficial cycle that enhances participation, motivation, and proficiency in FMS.

Research has extensively explored individual factors, yet few studies have integrated FMS proficiency, PA intensity, enjoyment, and perceived competence into a unified model. The interplay among these variables is intricate: PA intensity impacts skill acquisition, which subsequently influences enjoyment and perceived competence (20). Additionally, enjoyment and perceived competence may serve as mediators or moderators in the relationship between PA and motor competence. To navigate this complexity, structural equation modeling (SEM) offers a powerful analytical approach, enabling researchers to evaluate both direct and indirect relationships among various factors. This method provides valuable insights into how behavioral, cognitive, and emotional elements collectively shape motor development. By elucidating these relationships, researchers can pinpoint critical mediators, identify potential intervention strategies, and assess the relative importance of each factor in enhancing overall motor competence (21).

Previous studies have predominantly concentrated on interventions within school or laboratory environments, often neglecting the natural movement settings where children typically engage, such as playgrounds, homes, and community areas (22,23). It is crucial to explore how intrinsic motivation, particularly enjoyment, and self-perception of competence influence PA intensity and fundamental movement skills in these real-world contexts. This understanding is vital for creating interventions that are not only effective but also ecologically valid. Additionally, cultural, socioeconomic, and environmental factors may influence these dynamics, highlighting the importance of research that encompasses diverse populations and employs comprehensive measurement strategies.

This research is anchored in a theoretical framework that integrates Stodden's developmental model of motor competence (2008) with Harter's competence motivation theory (1978). Stodden et al. propose a reciprocal relationship where enhanced motor competence fosters increased participation in physical activities, which in turn further develops motor skills (24). Concurrently, Harter's theory emphasizes the role of perceived competence in driving motivation and sustained engagement (15). Together, these frameworks suggest that motor development is influenced by a dynamic interaction of behavioral and psychosocial elements, including activity intensity, enjoyment, and self-perception. To quantitatively assess this integrative model, the study employs SEM to evaluate both direct and mediated effects on motor competence. Consequently, the study seeks to address significant gaps in existing literature by examining the direct impacts of FMS proficiency and PA intensity on motor competence in children, exploring the mediating effects of enjoyment and perceived competence, and modeling indirect pathways that connect behavioral and psychosocial factors to overall motor development through SEM, thereby identifying potential targets for intervention.

This study aims to provide a comprehensive understanding of children's motor development by integrating physical, cognitive, and emotional aspects. The anticipated outcomes are intended to inform the creation of interventions in both school and home settings that enhance skill acquisition, boost participation in physical activities, and foster positive attitudes towards movement. Specifically, programs that address skill proficiency alongside psychosocial elements, such as enjoyment and perceived competence, are likely to yield better results in promoting sustained engagement and long-term motor development. Additionally, the research underscores the necessity of evidence-based approaches that take into account various factors influencing motor competence, rather than concentrating solely on isolated skills or activity levels. By examining the relationships among PA intensity, enjoyment, perceived competence, and fundamental movement skills, this study can guide educators, coaches, and parents in implementing effective strategies for skill development, including structured games, mastery-oriented feedback, and opportunities for enjoyable yet appropriately challenging activities.

2. Methods

2.1. Study Design

This research utilized a cross-sectional, correlational approach with SEM to investigate the interconnections between FMS proficiency, PA intensity, enjoyment of PA, perceived competence, and overall motor development in children. The choice of SEM allowed for the analysis of both direct and indirect influences of behavioral and psychosocial factors, thereby offering a holistic view of the pathways involved in motor development.

2.2. Participants

A total of 262 children, aged between 6 and 10 years, were recruited from five primary schools located in both urban and suburban areas. A priori power analysis using G*Power indicated that a sample of 262 participants provided adequate statistical power (> .80) to detect medium-sized effects in the SEM model. Participants were selected through school invitations and required parental consent. The inclusion criteria specified that children must be typically developing, without any diagnosed physical or neurological disorders, actively participating in school-based physical education programs, and capable of completing the assessment protocols. Those with injuries or mobility limitations were excluded from the study. The final cohort comprised 262 children, consisting of 136 boys and 126 girls, with an average age of 8.1 years (± 1.2). Demographic information, including age, sex, body mass index (BMI), and socioeconomic status, was gathered through questionnaires completed by parents.

2.3. Measurements

2.3.1. Fundamental Motor Skills

FMS proficiency was evaluated using the Test of Gross Motor Development–3rd Edition (TGMD-3) (25), a well-established assessment tool known for its high inter-rater reliability (ICC = 0.88–0.94) and strong construct validity. The TGMD-3 measures both locomotor skills, such as running, hopping, and skipping, and object-control skills, including throwing, catching, and kicking, through standardized demonstrations and performance evaluations. Each skill was scored based on the TGMD-3 criteria, and composite scores were computed to determine overall FMS proficiency.

2.3.2. Physical Activity Intensity

PA intensity was assessed using ActiGraph wGT3X-BT accelerometers, which participants wore for seven consecutive days during waking hours, excluding any water-based activities. The data were analyzed according to the cut-points established by Evans et al. to categorize activity into sedentary, light, moderate, and vigorous minutes, with MVPA serving as the primary variable of interest. Accelerometers are recognized as the gold standard for objectively measuring PA in children, demonstrating high reliability (ICC = 0.92) and validity (r = 0.71–0.85).

2.3.3. Enjoyment of Physical Activity

Enjoyment was evaluated using the Physical Activity Enjoyment Scale for Children (PACES-C) (27). This self-report questionnaire consists of 16 items rated on a 5-point Likert scale, where 1 indicates strong disagreement and 5 indicates strong agreement. The PACES-C has shown robust internal consistency, with reliability coefficients ranging from $\alpha = 0.87$ to 0.91, and it has established construct validity for children between the ages of 6 and 12 years. Nine experts confirmed the validity of this scale with CVI of 0.92 and CVR of 0.90.

2.3.4. Perceived Competence

The Pictorial Scale of Perceived Movement Skill Competence for Young Children (PMSC-YC) was utilized to assess children's perceived competence in motor skills (27). This scale allows children to evaluate their abilities in 12 FMS through visual representations, with scores ranging from 1, indicating low perceived competence, to 3, reflecting high perceived competence. The PMSC-YC exhibits strong reliability, evidenced by a Cronbach's alpha of 0.85, and demonstrates validity when compared to performance-based measures of fundamental movement skills. Nine experts confirmed the validity of this scale with CVI of 0.94 and CVR of 0.93.

2.3.5. Motor Development Outcome

Motor development was defined as a combination of fundamental movement skills (FMS) proficiency and PA participation, encompassing both skill-based and behavioral aspects. This composite measure facilitated the modeling of motor development as a latent variable within SEM, integrating the effects of both observable and latent indicators.

2.4. Procedure

Following the acquisition of approval from the Education Department and parental informed consent, children were evaluated in school gymnasiums or outdoor playgrounds during regular school hours, with assessments conducted over two 60-minute sessions at each school. The TGMD-3 assessment involved children performing each skill twice while being recorded on video, with trained evaluators scoring the footage based on TGMD-3 criteria; inter-rater reliability was confirmed through a 10% random sample prior to data collection. Additionally, children were equipped with accelerometers and given instructions on their proper use and maintenance, while parents kept logs to monitor compliance. Self-report questionnaires, specifically the PACES-C and PMSC-YC, were administered either individually or in small groups under supervision, with support provided for children who had limited reading abilities.

2.5. Statical Analysis

Data were evaluated for missing values, outliers, and adherence to normality. With less than 2% of the data missing, full information maximum likelihood was employed to address these gaps. Descriptive statistics, including mean, standard deviation (SD), and range, were computed for all variables. Additionally, bivariate correlations were analyzed to explore the initial relationships among FMS, PA intensity, enjoyment, and perceived competence. SEM was performed using AMOS 28.0 to analyze the proposed model of motor development. The study employed a latent variable framework, with motor development conceptualized as a latent construct indicated by scores from the TGMD-3, which assesses locomotor and object-control skills, alongside minutes of MVPA. FMS proficiency and PA intensity were treated as exogenous variables, while enjoyment and perceived competence served as mediators. The estimation of direct and indirect paths was carried out using maximum likelihood estimation. To assess model fit, several indices were utilized, including the chi-square to degrees of freedom ratio ($\chi^2/df < 3$), Comparative Fit Index (CFI ≥ 0.95), Tucker-Lewis Index (TLI ≥ 0.95), Root Mean Square Error of Approximation (RMSEA ≤ 0.06),

and Standardized Root Mean Square Residual (SRMR ≤ 0.08). The indirect effects of FMS proficiency and PA intensity on motor development were evaluated through bootstrapping, utilizing 5,000 resamples to create bias-corrected 95% confidence intervals. Significance was established when the confidence interval did not encompass zero. All analyses were performed using IBM SPSS version 28.0 for descriptive statistics and correlation assessments, while SEM and mediation analysis were conducted with AMOS version 28.0. A significance level of $p < 0.05$ was established for all tests.

3. Results

3.1. Demographic Characteristics

A total of 262 children, comprising 136 boys and 126 girls, aged between 6 and 10 years, were involved in the study. The average age of participants was 8.1 years with a SD of 1.2 years, while the mean BMI was recorded at 17.8 kg/m², with a SD of 2.5 kg/m², aligning with national growth standards for this age group. Socioeconomic status (SES) was classified according to parental reports of income and education, revealing that 38% of the participants were from low SES backgrounds, 44% from middle SES, and 18% from high SES. A summary of the participant demographics can be found in Table 1.

Table 1. Participant Demographics (N=262).

Variable	Mean ± SD / n (%)
Age (years)	8.1 ± 1.2
Sex (boys/girls)	136 (51.9%) / 126 (48.1%)
BMI (kg/m²)	17.8 ± 2.5
Socioeconomic status	
Low	100 (38%)
Middle	115 (44%)
High	47 (18%)

3.2. Descriptive Statistics of Study Variables

Descriptive statistics for FMS proficiency, PA intensity, enjoyment, perceived competence, and overall motor development are presented in Table 2.

Table 2. Descriptive Statistics for Main Study Variables.

Variable	Mean ± SD	Range
TGMD-3 Locomotor Skills	25.3 ± 5.8	12–36
TGMD-3 Object-Control Skills	22.7 ± 6.1	10–35
Total FMS Proficiency	48.0 ± 10.2	22–68
MVPA (min/day)	42.6 ± 15.4	12–78
PACES-C Enjoyment Score	3.9 ± 0.6	2.3–5.0
Perceived Competence (PMSC-YC)	2.4 ± 0.4	1.5–3.0
Motor Development Composite	0 ± 1 (standardized)	-3.0–3.2

3.3. Bivariate Correlations

Pearson correlations among FMS proficiency, PA intensity, enjoyment, perceived competence, and motor development are reported in Table 3. All variables were positively and significantly correlated ($p < 0.01$), indicating preliminary support for the hypothesized SEM model.

Table 3. Correlations Among Study Variables.

Variable	1	2	3	4	5
1. FMS Proficiency	1				
2. MVPA (min/day)	0.56**	1			
3. Enjoyment	0.48**	0.51**	1		
4. Perceived Competence	0.50**	0.46**	0.61**	1	

** $p < 0.01$

3.4. Structural Equation Modeling Results

The proposed SEM framework examined both the direct impacts of FMS proficiency and PA intensity on motor development, as well as their indirect influences through enjoyment and perceived competence. The model demonstrated strong fit indices, with a chi-square to degrees of freedom ratio of 2.15, which is considered acceptable when below 3. Additionally, the CFI was recorded at 0.968, and the TLI at 0.961, both indicating a high level of model adequacy. Furthermore, the RMSEA was 0.049, and the SRMR was 0.043, both suggesting a robust alignment between the hypothesized model and the observed data.

3.5. Direct Effects

Table 4 and Figure 1 display the direct standardized path coefficients, revealing that both FMS proficiency and PA intensity exert significant positive influences on motor development, with coefficients of $\beta=0.44$ ($p<0.001$) and $\beta=0.31$ ($p<0.001$), respectively. Additionally, FMS proficiency is a strong predictor of enjoyment ($\beta=0.38$, $p<0.001$) and perceived competence ($\beta=0.41$, $p<0.001$). Similarly, PA intensity significantly predicts enjoyment ($\beta=0.36$, $p<0.001$) and perceived competence ($\beta=0.29$, $p<0.001$). Furthermore, both enjoyment ($\beta=0.25$, $p<0.001$) and perceived competence ($\beta=0.28$, $p<0.001$) demonstrate significant direct effects on motor development.

Table 4. Standardized Direct Path Coefficients.

Predictor	Outcome	β	SE	p-Value
FMS Proficiency	Motor Development	0.44	0.06	<0.001
PA Intensity	Motor Development	0.31	0.05	<0.001
FMS Proficiency	Enjoyment	0.38	0.05	<0.001
FMS Proficiency	Perceived Competence	0.41	0.06	<0.001
PA Intensity	Enjoyment	0.36	0.05	<0.001
PA Intensity	Perceived Competence	0.29	0.05	<0.001
Enjoyment	Motor Development	0.25	0.05	<0.001
Perceived Competence	Motor Development	0.28	0.05	<0.001

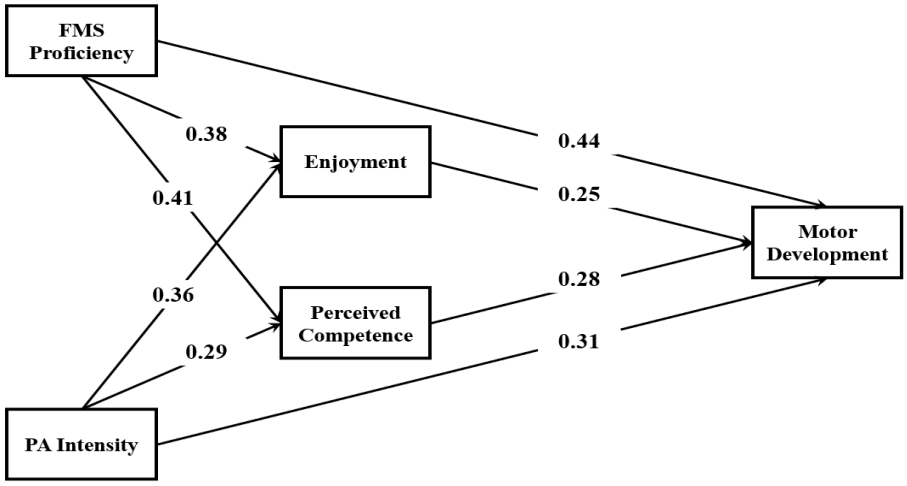

Figure 1. Research model (β coefficient).

3.6. Indirect and Total Effects

Bootstrapped mediation analyses revealed significant indirect effects of FMS proficiency and PA intensity on motor development, mediated by enjoyment and perceived competence (all p<0.01). Specifically, FMS proficiency influenced motor development indirectly through perceived competence (β=0.11, 95% CI [0.06, 0.17]) and enjoyment (β=0.09, 95% CI [0.05, 0.15]). Similarly, PA intensity demonstrated significant indirect effects via perceived competence (β=0.08, 95% CI [0.03, 0.13]) and enjoyment (β=0.09, 95% CI [0.04, 0.14]). The total effects, combining both direct and indirect pathways, were substantial for FMS proficiency (β=0.64, p<0.001) and PA intensity (β=0.48, p<0.001), underscoring the importance of both behavioral and psychosocial factors in enhancing children's motor competence.

4. Discussion

This study investigated the connections between FMS proficiency, PA intensity, enjoyment of PA, perceived competence, and motor development in children aged 6 to 10 years. Utilizing SEM with a sample of 262 participants, the research identified both direct and indirect pathways through which motor skill competence and PA impact motor development. This highlights the significant role of behavioral and psychosocial factors during early childhood. The results offer important insights for researchers, educators, and practitioners aiming to improve motor competence and encourage lifelong PA among children.

FMS proficiency has been identified as a crucial direct predictor of motor development, consistent with existing research. Children exhibiting advanced locomotor and object-control skills tend to show enhanced overall motor competence, indicating that the mastery of fundamental motor patterns is essential for the development of more complex motor behaviors. This observation supports the developmental cascade hypothesis, which asserts that the early acquisition of fundamental skills lays the groundwork for subsequent motor, cognitive, and social advancements (24). The direct relationship between FMS and motor development emphasizes the necessity of incorporating structured motor skill programs into early childhood and primary school education. Additionally, the positive correlation between PA intensity, defined as MVPA minutes per day, and motor development suggests that active children benefit from increased opportunities to practice and enhance their motor skills, while also building strength, coordination, and endurance - key elements of overall motor competence. This finding aligns with previous studies that highlight the importance of regular engagement in physically demanding activities as a significant factor influencing both skill proficiency and health-related fitness outcomes (20). Collectively, these findings underscore the role of behavioral factors, including skill proficiency and PA engagement, as fundamental components of motor development, with the substantial effects of FMS (β=0.64) and PA intensity (β=0.48) indicating that targeted interventions in either area can significantly improve children's motor competence.

This study makes a significant contribution by identifying psychosocial mediators, particularly enjoyment of PA and perceived competence. SEM results revealed that both FMS and PA directly and indirectly influenced motor development through these mediators. Notably, enjoyment of PA was found to significantly mediate the relationship between FMS/PA and motor development, supporting the principles of Self-Determination Theory (28), which posits that intrinsic motivation drives behavior.

Children who find joy in PA are more inclined to participate voluntarily, leading to increased practice and reinforcement of their motor skills. This suggests that interventions aimed at enhancing the enjoyment of PA - such as incorporating games and skill-based challenges - could further enhance the effectiveness of skill training. Additionally, perceived competence emerged as a crucial mediator, emphasizing the impact of children's self-perceptions on motor outcomes. Consistent with previous research (19,29), children who view themselves as competent in motor skills are more likely to engage in PA and tackle new motor challenges, fostering a positive feedback loop that supports skill development. The partial mediation effect indicates that while objective levels of FMS and PA are essential, children's confidence and self-efficacy are vital in translating these behaviors into broader motor competence. By integrating both enjoyment and perceived competence within a single SEM framework, this study offers a holistic perspective that captures both behavioral and psychosocial pathways to motor development. Importantly, the indirect effects, although smaller than the direct effects, were statistically significant, reinforcing the notion that affective and cognitive perceptions play a crucial role in enhancing the transition from skill and activity to motor competence.

The findings of the study present important implications for educators, coaches, and policymakers. It is essential to prioritize structured motor skill training within early childhood and primary education curricula, utilizing programs like the TGMD to enhance locomotor and object-control skills, which are crucial for overall motor development. Additionally, interventions should focus on promoting high-intensity PA alongside skill practice, as this combination not only improves competency but also supports cardiovascular fitness and coordination. Incorporating activities such as aerobic circuits, playground games, and active recess can effectively increase MVPA while reinforcing motor skills. Furthermore, the study highlights the significance of enjoyment and perceived competence in designing interventions. Programs that are engaging, developmentally suitable, and provide positive reinforcement can cultivate intrinsic motivation, leading to sustained participation. Strategies like gamification, mastery-oriented feedback, and personalized goal-setting can enhance children's sense of competence. Lastly, the findings advocate for a holistic approach to motor development, emphasizing the need to address not only performance outcomes but also the psychosocial factors influencing children's engagement in physical activities. By targeting skill proficiency, PA, and emotional aspects simultaneously, educators and coaches can optimize developmental outcomes.

This study enhances the existing frameworks of motor development by offering empirical support for a pathway model that incorporates both behavioral and psychosocial elements. Unlike previous research that has typically analyzed FMS, PA, and perceived competence in isolation, this investigation reveals the intricate interactions among these variables and their collective impact on motor development. Utilizing SEM with latent constructs enabled the exploration of both direct and indirect effects, thereby reflecting the complexity of developmental processes in children. Additionally, the findings bolster the conceptual model (24), which suggests that PA, FMS, and psychosocial factors dynamically interact over time to influence motor competence. By providing quantitative evidence of mediation pathways, this study deepens our understanding of how skill acquisition, activity levels, enjoyment, and confidence converge to foster motor development, thereby identifying potential areas for early intervention.

The study presents several notable strengths, including a substantial sample size of 262 participants, which enhances both statistical power and the generalizability of the findings. The employment of validated and reliable instruments for assessing FMS (TGMD-3), PA intensity (accelerometry), enjoyment (PACES-C), and perceived competence (PMSC-YC) further bolsters the accuracy of the measurements. Additionally, the use of a SEM approach allows for a detailed exploration of the complex relationships between direct and indirect factors influencing motor development. However, there are important limitations to consider. The cross-sectional nature of the study limits the ability to draw causal conclusions, necessitating longitudinal research to establish temporal relationships among FMS, PA, enjoyment, perceived competence, and motor development. Furthermore, while accelerometers provide objective data on PA, they may not adequately capture water-based or non-ambulatory activities. Self-reported measures of enjoyment and perceived competence could be influenced by social desirability bias, despite efforts to use pictorial and age-appropriate formats to reduce this risk. Lastly, the sample's composition from urban and suburban schools may restrict the applicability of the findings to rural populations or children with developmental disabilities.

Future studies should focus on longitudinal and intervention-based approaches to determine if enhancements in FMS and PA intensity contribute to lasting improvements in motor development through psychosocial mechanisms. Additionally, investigating contextual elements such as parental involvement, the school environment, and peer dynamics could yield a more nuanced understanding of motor development pathways. Exploring moderating factors like age, gender, and socioeconomic status may reveal which specific groups gain the most from targeted interventions. Lastly, incorporating technology-driven strategies, such as interactive gaming and wearable feedback tools, could boost engagement and skill development by leveraging the motivational aspects of enjoyment and perceived competence.

4.1. Conclusion

The current research indicates that proficiency in FMS and the intensity of PA are strong predictors of children's motor development, with enjoyment and perceived competence acting as key mediators. These results emphasize the intricate relationship between behavioral and psychosocial elements in the development of motor skills, highlighting the importance of comprehensive, engaging, and skill-oriented interventions. By addressing both the physical and emotional aspects of motor development, educators, coaches, and policymakers can promote positive growth trajectories, enhancing not only children's immediate health and performance but also their long-term commitment to PA and overall well-being.

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Footnotes

Authors' Contribution: This study was carried out solely by the corresponding author.

Conflicts of Interest

Non to declare.

Data Availability: The data that support the findings of this study are openly available upon request from the corresponding author.

Ethical Approval: The author confirms that all steps and requirements of this study comply with ethical guidelines. Participants were informed about the characteristics of the study and gave written informed consent.

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