A model of physical literacy, parental involvement, and social factors on motor development in children with social development as a moderator

Un modelo de alfabetización física, participación de los padres y factores sociales en el desarrollo motor de los niños con el desarrollo social como moderador

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Abstract

Introduction: Early motor development is crucial for children's growth, but inactivity, lack of parental awareness, and excessive screen time hinder progress. Urgent interventions are needed to promote active lifestyles from an early age.
Objective: this study explores the moderating effects of social development on the relationship between parental physical literacy, parental involvement, and other social factors, and child motor development.
Methodology: Utilizing a quantitative approach and a cross-sectional design, online surveys with Likert scales and Structural Equation Modeling-Partial Least Squares (SEM-PLS) analysis were employed.
Results: The findings underscore the positive influence of parental physical literacy and parental participation in physical activities on child motor development, particularly among children who exhibit strong social skills.
Discussion: However, social variables such as norms and social support did not demonstrate a significant impact. The study's findings indicate a strong correlation between parents' physical literacy, their involvement in physical activities, and children's social development.
Conclusions: The study's conclusions suggest that enhancing motor development in children can be achieved through parental training in physical literacy and the promotion of physical activities during childhood.

Keywords

Physical literacy; parental involvement; social factors; physical motor development; social development.

Resumen

Introducción: El desarrollo motor temprano es crucial para el crecimiento de los niños, pero la inactividad, la falta de concienciación de los padres y el exceso de tiempo frente a la pantalla obstaculizan el progreso. Se necesitan intervenciones urgentes para promover estilos de vida activos desde edades tempranas.
Objetivo: este estudio explora los efectos moderadores del desarrollo social en la relación entre la alfabetización física parental, la implicación parental y otros factores sociales, y el desarrollo motor infantil.
Metodología: Utilizando un enfoque cuantitativo y un diseño transversal, se emplearon encuestas en línea con escalas Likert y análisis de Modelado de Ecuaciones Estructurales-Mínimos Cuadrados Parciales (SEM-PLS).
Resultados: Los hallazgos subrayan la influencia positiva de la alfabetización física de los padres y la participación de los padres en actividades físicas en el desarrollo motor infantil, particularmente entre los niños que muestran fuertes habilidades sociales.
Discusión: Sin embargo, variables sociales como las normas y el apoyo social no demostraron un impacto significativo. Los resultados del estudio indican una fuerte correlación entre la alfabetización física de los padres, su participación en actividades físicas y el desarrollo social de los niños.
Conclusiones: Las conclusiones del estudio sugieren que la mejora del desarrollo motor de los niños puede lograrse mediante la formación de los padres en alfabetización física y la promoción de actividades físicas durante la infancia.

Palabras clave

Alfabetización física; participación de los padres; factores sociales; desarrollo motor físico; desarrollo social.

Introduction

Physical motor development in early childhood constitutes a vital foundation upon which movement skills are based throughout life. During this period, children experience a 'golden phase' that significantly influences their physical ability to perform daily activities and participate in various social activities (Capio & Eguia, 2021). Moreover, physical motor development contributes substantially to children's cognitive, social and emotional development. Engaging in physical activities that require body coordination enables children to develop an understanding of spatial and temporal concepts, as well as social relations. This, in turn, fosters their confidence and ability to interact with their environmen (Foulkes et al., 2022). Furthermore, this stage provides an early foundation for the development of a sustainable healthy lifestyle, wherein the possession of fundamental physical skills enables children to maintain physical activity across different phases of life (Dobell et al., 2020).

It is important to note, however, that not all toddlers realise their full physical potential.The absence of organised physical exercise in the home and in the classroom is a significant contributing factor to the delays in this development that many young people experience.According to data from the World Health Organization (WHO) (Nguyen et al., 2023), more than 80% of children worldwide aged between 5 and 17 do not achieve the recommended 60 minutes of physical activity every day. A report by the Ministry of Health in 2023 stated that at least 52.6% of toddlers were physically inactive due to a predominance of passive lifestyle behaviours, including excessive use of digital devices in Indonesia (Wong et al., 2020). Another major obstacle is the lack of physical literacy, which includes things like parents' and children's lack of understanding about the significance of physical activity. The Indonesian public's limited understanding of the importance of physical activity for children is evidenced by the country's low physical literacy score of D in the Global Matrix 4.0 Report 2022 (Brown et al., 2020; World Health Organization, 2018).

The family and social environment is frequently found to be deficient in terms of the provision of facilities, attention to children's physical needs, and active family or social environment involvement in children's physical activities.According to BPS data from 2022, it is stated that families in Indonesia provide physical play facilities for families at home or in the neighbourhood only 34% of the time (Montesinos et al., 2021). This situation is further exacerbated by modern lifestyles, which result in children spending more time exposed to digital devices than engaging in active outdoor play.According to the 2022 APJII survey, 53.3% of young children use devices for more than two hours daily, which is disproportionate for their age group (Montesinos et al., 2021). This disparity, if unaddressed, has the potential to impede physical development, socialisation, and participation in group activities later in life.Consequently, there is an imperative for interventions to address the factors that influence motor development in early childhood (Özal et al., 2020).

Physical literacy can be defined as the mindset, motivation, understanding and skills necessary to participate in physical activity continuously (Rhodes et al., 2020). It is regarded as one of the main concepts of children's physical education, and it usually consists of basic movements such as running, jumping and throwing. However, it also serves to lay the foundation for lifelong healthy habits. A study by Caldwell et al. (2020) emphasised the significance of physical literacy in facilitating optimal motor development in children. Furthermore, children who possess strong physical literacy tend to engage in higher levels of physical activity, adopt healthy lifestyles, and exhibit greater confidence in participating in diverse physical activities within social contexts (Lane et al., 2021). However, physical literacy is often overlooked, particularly in the context of informal education at home, where parents tend to prioritise academic performance or the use of digital devices to silence children.Consequently, children have reduced opportunities to develop movement skills through sports due to this decline in physical activity (Mad & Mohamed, 2023).

The involvement of parents in their children's play and activity has been shown to foster strength and motor development, as well as to promote learning new movements. This involvement can be facilitated through the provision of suitable play and exercise environments, as well as through parental encouragement. Such engagement has been shown to foster increased confidence and eagerness to explore physical abilities in children (Beach et al., 2021). Furthermore, parental involvement has been demonstrated to strengthen emotional bonds and set a positive example of a healthy lifestyle (Versele et al., 2022). However, challenges in modern society, such as time constraints due to work demands, limited

access to safe play facilities, and increased use of technology, often hinder parental involvement. Consequently, there is a necessity for a methodical approach, encompassing the implementation of awareness campaigns, community programs, and practical guides, with the aim of empowering parents to provide active and consistent support for their children's physical motor development (Uludağ & Erkan, 2023).

The impact of early childhood social development on physical motor development has been a subject of considerable research interest. Children who possess proficient social skills, such as the capacity to interact and cooperate, demonstrate a higher level of physical activity and a greater propensity to acquire new motor skills (Eliassy et al., 2021). Engagement in physical activity, facilitated by positive social interactions with peers or family members, has been shown to foster healthy emotional development. Conversely, children encountering challenges in social development may exhibit diminished confidence, leading to reluctance to engage in physical activities, which can impede their motor development (Redquest et al., 2020). The impact of social development on motor development is multifaceted, with the capacity to either augment or mitigate the influence of other factors, including physical literacy and parental involvement, which are associated with optimal motor development practices.

This study represents a significant contribution to the field of research on early childhood physical motor development, as it integrates physical literacy in early childhood and the role of parents and social factors affecting physical motor development. This research is novel in its approach, as it explores the relationship between these factors, a gap that has not been previously addressed. The study also reveals social development as a moderating variable, offering novel insights into the relevant preschool context to facilitate physical motor development.

The influence of early childhood social development on physical motor development is a key finding, with children demonstrating stronger social skills, such as communication and cooperation, tending to participate more in physical activities and acquire new motor skills. Positive social interactions with peers or family have also been identified as a factor encouraging participation in physical activities and supporting emotional development. Conversely, children who struggle with social development may exhibit a lack of confidence and be reluctant to participate, thereby hindering their motor development. The present study hypothesises that social development exerts a moderating influence on the relationship between physical literacy and parental involvement, and the achievement of optimal motor development in children. The objective of this research is to investigate the moderating effects of social development on the relationship between physical literacy, parental participation, and other social factors, and the physical motor development of children in kindergarten. The overarching objective of this study is to establish a robust foundation for supporting children's holistic development. It is expected that the findings of this study will provide parents, educators, and policymakers with actionable recommendations for enhancing the quality of early childhood education, particularly in the domains of social and physical motor skills.

Method

Design, population, sample, and sampling technique

This study explores the impact of physical literacy, parental involvement, and social factors on physical motor development in early childhood, with social development as a moderator.A quantitative approach using an explanatory research method and cross-sectional design was applied in Malang City, chosen for its diversity in these factors and early childhood education facilities.The multistage sampling technique was employed, starting with cluster sampling to select kindergartens across five sub-districts. Stratified random sampling was employed to ensure diverse representation, and 600 parent-child pairs (aged 4-6 years) were randomly selected.

Variables and measurement

This study utilised a 1-5 Likert scale to assess several variables that influence early childhood physical motor development. The variables encompassed Parental Physical Literacy Competence, Parental Skills, Parental Involvement, Social Support, Social Norms and Social Security. This scale was employed to elevate the level of respondents' identity, thereby ensuring that the statements employed were more detailed. The scale utilised a five-point rating system, ranging from 1 = strongly disagree to 5 = strongly

agree. Furthermore, the assessment of Fine Motor Development, Gross Motor Development and Social Development was conducted utilising a 1-4 scale. The employment of this scale is intended to circumvent the neutral bias that frequently manifests in unconventional scales, thereby ensuring that each category possesses a definitive developmental significance.The scale employed for the assessment of aspects of child development is as follows: 1 = not yet developing, 2 = starting to develop, 3 = developing as expected, and 4 = developing very well.These measurements allow the study to evaluate the relationship between these variables in influencing children's motor development, with social development as a moderator that can strengthen or weaken the relationship between factors.Table 1 shows the variables used in this study and their measurement indicators.

Table 1. Variable and measurement indicators

Variable	Measurement Indicators	Scale	Source
Parent Physical Literacy Competence (X1)	Understanding physical literacy concepts Knowledge of body movements Ability to teach basic motor skills Designing movement activities Teaching coordination and balance Evaluating motora habilidad development	1-5	Ha, He, Lubans, Chan, & Ng (2022); Lane et al. (2022)
Parental Skill (X2)	Ability to model appropriate physical activities Knowledge of child development in relation to motor skills Providing guidance on physical activity safety	1-5	Amin & Eliasa, (2023); Çirlak & Törüner (2023)
Parental Engagement (X3)	Frequency of involvement in child's physical activities Providing opportunities for physical activity at home Encouraging active play Offering praise and motivation for physical engagement	1-5	Wondim (2025); Yang et al. (2023)
Social Support (X4)	Availability of emotional support Practical support from family Community involvement in physical activities Access to resources and facilities for physical activities	1-5	Menengiç et al. (2023); Yuan et al. (2024)
Social Norms (X5)	Participation in group activities Acceptance within peer groups Interaction with peers during physical activities Encouragement of cooperative behavior Social inclusion during playtime	1-5	Edirneligil & Tanhan (2024); Gonzalez-Gadea, (2021)
Social Security (X6)	Safe physical environment during activities Psychological security in social interactions Protective measures for physical activities	1-5	Jung (2020); Yang et al. (2022)
Fine Motor Development (Y1)	Drawing and writing skills Fine motor hand-eye coordination Ability to manipulate small objects Finger strength and dexterity Precision in tasks like cutting or coloring Coordination between hand and finger movements	1-4	Cheung et al. (2022); Indrawati et al. (2020)
Gross Motor Development (Y2)	Running and jumping skills Ability to climb and balance Coordination between upper and lower body Endurance in physical activities Control over large body movements Agility in moving between tasks	1-4	Boonzaaijer et al. (2021); Puspitasari et al. (2021)
Social Development (M)	Emotional expressionn and regulation Ability to share and collaborate with peers Verbal and non-verbal communication with peers Developing empathy towards others Building friendships and teamwork skills	1-4	Hygen et al. (2020); Moon et al. (2019)

Data collection and data analysis

The data presented herein were collected through a Likert scale-based questionnaire (1-4 and 1-5) designed to assess parental physical literacy, parental skills and involvement, social factors, and early childhood motor and social development. The questionnaire was organised based on indicators relevant to each variable and distributed online via Google Forms to ensure easy access for respondents and increase participation. The respondents in this study consisted of parents of young children who had experience in parenting and supporting their child's motor development.

Following the collection of the data, an analysis was conducted using Structural Equation Modeling-Partial Least Squares (SEM-PLS) to evaluate the relationships between the variables. This analysis was performed in several stages. The first stage was the testing of the external model, which aimed to evaluate

the validity and reliability of the indicators in measuring each research construct, to ensure that the instrument used can accurately describe the concept being measured. Furthermore, an internal model test was conducted, which is an analysis of the relationship between latent variables to identify factors that influence early childhood motor development. In addition, this study also conducted moderation tests that focused on the role of social development in strengthening or weakening the relationship between parental involvement, social factors, and children's motor development. The SEM-PLS approach was chosen because it can handle research models with complex relationships and does not require strict data distribution assumptions. Utilising this methodology, the present study was able to identify the key factors that contribute to early childhood motor development and understand how the interaction between social factors and parental involvement can influence overall child development outcomes.

Results

Respondents' characteristics

The characteristics of the respondents are important to add context and external validity to the research findings, i.e. generalizability and applicability of the results.

Table 2. Summarizes the characteristics of the respondents in this study.

Characteristic respondents Respondent Characteristic	Frequency (n)	Percentage (%)	Mean		
			Y1	Y2	M
Mother's age					
21–30 years	213	35.50	3.20	3.35	2.95
31-40 years	312	52.00	3.22	3.31	3.00
>40 years	75	12.50	3.25	3.28	2.90
Mother's educational					
Junior High School	81	13.50	3.10	3.25	2.80
Senior High School/ Equivalent	260	43.33	3.20	3.30	2.95
Higher Education	259	43.17	3.23	3.34	2.98
Mother's employment status					
Unemployed	310	51.67	3.18	3.25	2.93
Employed	290	48.33	3.25	3.32	3.00
Caregiver					
Mother	322	53.67	3.20	3.30	2.95
Mother and other caregiver	278	46.33	3.22	3.29	3.00
Father's employment					
Freelance	40	6.67	3.15	3.20	2.85
Employee	375	62.50	3.21	3.31	2.95
Entrepreneur	185	30.83	3.23	3.35	3.00
Household monthly income					
<3.5 million rupiah	184	30.67	3.18	3.26	2.90
≥3.5 million rupiah	416	69.33	3.23	3.33	3.05
Residence Type					
Residential	217	36.17	3.20	3.30	2.95
Township	383	63.83	3.22	3.31	3.00
Child's age					
48-60 months	319	53.17	3.21	3.30	2.98
61–72 months	281	46.83	3.22	3.32	2.98
Child's gender					
Male	292	48.67	3.21	3.30	2.95
Female	308	51.33	3.22	3.31	3.00
Kindergarten Type					
Public	155	25.83	3.10	3.20	2.85
Private	445	74.17	3.24	3.35	3.05
Child's Sibling Status					
Only Child	170	28.33	3.15	3.22	2.85
Not Only Child	430	71.67	3.22	3.31	3.05
Total	600	100	3.21	3.30	2.98

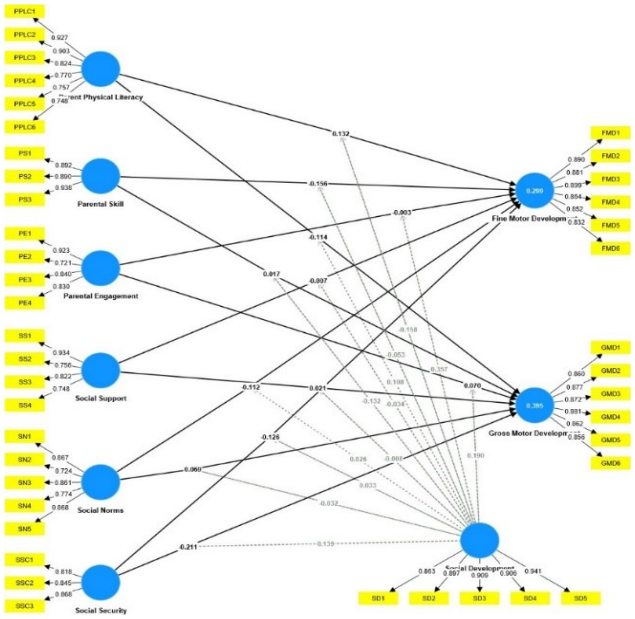
The data indicates that almost half of the mothers had attained a high school diploma, with a significant proportion holding a bachelor's degree or higher qualification. The majority of these women fell within the 31 to 40 age brackets. The primary responsibility for childcare fell on the mothers, with them spending an average of 48.3% of their time in this role. The majority of mothers were not engaged in employment, with 51.7% not in paid work. The majority of families (63%) had an income of more than 3 million

rupiahs, and the majority of fathers were employed as workers or self-employed (30.7%).The vast majority of households (63.8%) were private residences.With regard to the characteristics of the children, the majority were aged between 48 and 60 months (46.5%), were male (53.3%), and attended a private kindergarten (74.2%). This data demonstrates a sample population with a diverse family structure, where socioeconomic status, parental roles, and parenting patterns can influence children's motor and social development.

Outer model

The outer model illustrates the relationship between indicators and latent constructions, assessing how well the data reflects the theoretical concepts. Figure 1 presents the results of this model

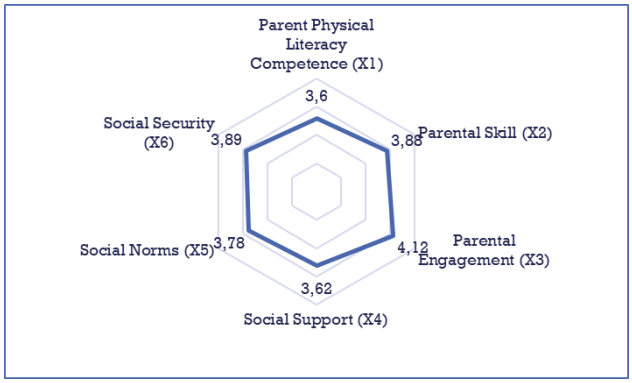
Figure 1. Outer model result



Fuente: Datos del investigador

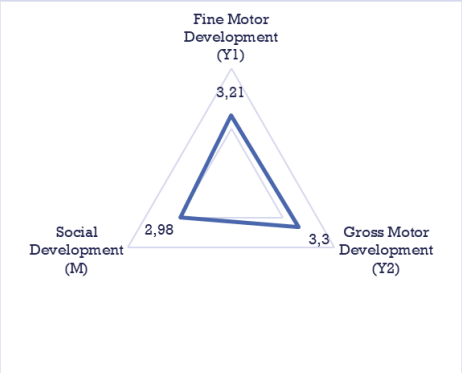
The outer model results indicate that all indicators have loading factor values greater than 0.7, suggesting excellent convergent validity. Each indicator is found to be a significant representation of the construction being measured, including X1, X2, X3, X4, X5 and X6, as well as endogenous variables such as Y1, Y2 and M. This validity suggests that the measurement model is appropriate for further analysis.

Figure 2. Graph of x variable comparison results.



Fuente: Datos del investigador

Figure 3. Graph of the results of comparing variables y and m



Fuente: Datos del investigador

Table 3. Reliability and correlations result

Variable	NID	Scale	Mean	Cronbach's alpha	rho_a	rho_c	AVE	Correlation	
								Y1	Y2
X1	6	1-5	3.60 (0.71)	0.936	0.939	0.949	0.757	0.67**	0.64**
X2	3	1-5	3.88 (0.66)	0.934	0.936	0.948	0.753	0.72**	0.69**
X3	4	1-5	4.12 (0.98)	0.939	0.884	0.927	0.680	0.83**	0.81**
X4	4	1-5	3.62 (0.73)	0.857	1.061	0.899	0.692	0.40**	0.46**
X5	5	1-5	3.78 (0.89)	0.901	1.049	0.933	0.822	0.44**	0.51**
X6	3	1-5	3.89 (0.65)	0.943	0.946	0.957	0.816	0.86**	0.85**
Y1	6	1-4	3.21 (0.55)	0.886	0.987	0.911	0.674	1**	0.84**
Y2	6	1-4	3.30 (0.63)	0.799	0.804	0.881	0.712	0.90**	1**
M	5	1-4	2.98 (0.64)	0.872	1.055	0.890	0.670	0.42**	0.44**

As demonstrated in Table 3, all the variables exhibit high levels of internal consistency, and the constructs' reliability is confirmed by Cronbach's Alpha and Composite Reliability values over 0.7. The Average Variance Extracted (AVE) values also indicate good construct validity, with X1 having an AVE of 0.757, and other variables supporting a strong measurement model. A series of significant positive correlations were observed between X1 and Y1 (r = 0.72) as well as Y2 (r = 0.66), and between X4 and both outcomes (r = 0.65 and r = 0.58).M as a moderator shows moderate correlations with Y1 (r = 0.42) and Y2 (r = 0.44). These findings underscore the significance of enhancing parental physical literacy, parental skills, and social support systems to optimise the physical and social development of preschool children.

Table 4. Direct effect

Direct Effect	Original Sample (O)	T statistics (|O/STDEV|)	P values
X1→Y1	0.332	3.281	0.000
X1→Y2	0.414	4.041	0.000
X3→Y1	0.303	3.020	0.000
X3→Y2	0.470	4.569	0.000
X2→Y1	0.356	3.580	0.000
X2→Y2	0.417	4.115	0.000
M→Y1	0.436	4.260	0.000
M→Y2	0.529	5.358	0.000
X5→Y1	0.112	0.920	0.358
X5→Y2	0.069	0.623	0.533
X6→Y1	0.126	1.073	0.283
X6→Y2	0.211	1.869	0.062
X4→Y1	0.007	0.047	0.963
X4→Y2	0.021	0.160	0.873

As illustrated in Table 4, the primary factors examined in this study have been found to exert a significant positive influence on the development of fine motor skills in early childhood. Specifically, factors X1, X3 and X2 have been demonstrated to have a substantial impact on the motor development of children in the early years. Furthermore, the study has revealed that children's social development (M) plays a pivotal role in enhancing their motor development. In contrast, factors X5, X6 and X4 have been observed to exert only a weak or insignificant effect on motor development in the context of this study.

Table 5. Moderating effect

Moderating Effect	Original Sample (O)	T statistics (|O/STDEV|)	P values
M x X1→Y1	0.344	2.474	0.011
M x X1→Y2	0.408	3.562	0.000
M x X2→Y1	0.453	3.705	0.000
M x X2→Y2	0.532	4.736	0.000
M x X3→Y1	0.357	2.584	0.010
M x X3→Y2	0.190	1.406	0.160
M x X6→Y1	0.033	0.309	0.757
M x X6→Y2	0.139	1.265	0.206
M x X4→Y1	-0.034	0.249	0.803
M x X4→Y2	-0.008	0.066	0.947
M x X5→Y1	0.026	0.248	0.804
M x X5→Y2	-0.032	0.292	0.770

As demonstrated in Table 5, social development has been shown to moderate the relationship between parental physical literacy and children's motor skills, with significant effects on both fine motors (0.344, p=0.011) and gross motor (0.408, p=0.000). Furthermore, the interaction between social development and parental skills had a significant positive impact on both fine motor (0.453, p=0.000) and gross motor (0.532, p=0.000). However, the moderation effect of social development on parental involvement was only significant for fine motor development (β = 0.357, p = 0.010) and not for gross motor development (β = 0.190, p = 0.160). Consequently, social factors such as social safety and social support did not have a significant effect on motor development.In summary, social development enhanced the influence of parental physical literacy and skills on children's motor development.

Discussion

The influence of parent physical literacy on child motor development moderated by social development

The findings of the present study suggest that parental physical literacy exerts a significant influence on children's motor development, particularly when social development functions as a moderator. Research has demonstrated that children's development of motor skills, both fine and gross, is considerably influenced by their parents' level of physical literacy. This literacy encompasses their knowledge, abilities, and drive to encourage their activities (Lane et al., 2021). However, the benefits of physical literacy are not limited to this domain. Specifically, children who demonstrate superior social development abilities exhibit a more favourable response to physical support, leading to enhanced motor skill development (Qinghua & Ompok, 2022). In conclusion, the present study underscores the pivotal role of a socially supportive environment in amplifying the connection between parental physical literacy and child motor development.

The present findings underscore the pivotal role of child mimicking behaviour in parents, which has the potential to amplify the impact of parental physical literacy on child motor development (Zhong et al., 2020). For children who possess proficient social skills, such as the capacity to engage in play with peers, participate in group activities, and communicate effectively with adults, there is a heightened probability of deriving benefits from their parents' motor stimulation. Social development affords children the opportunity to apply their motor skills to specific situations, thereby facilitating more rapid motor learning through interaction with peers and observation of their environment (Jankowska & Gralewski, 2022). In accordance with the social development theory that the social environment can always perform a role in children's physical and cognitive development (Yafie, Ashari, et al., 2024).

The present study's findings corroborate those of Iverson (2021), who found that children learn best in a group setting and that parents' participation in their physical activity had a substantial impact on their children's development of gross motor skills. The present study emphasises that children benefit from their parents' physical literacy by establishing a foundation for motor development. However, the impacts of physical literacy become more significant over time as children engage in social interactions with diverse actors, including in play groups. In a separate study Yoder et al, (2021), demonstrated that the social environment can amplify the impact of physical activity on children's motor skills. This is because children learn not only from parental teaching but also from imitation and cooperation during exercise with friends. Furthermore, research by Lane et al. (2021), provides evidence that parental

physical literacy, along with social exposure, can significantly enhance children's movement competence. It is evident that children who regularly socialise with peers in a conducive environment frequently engage in activities that demand greater motor skills, including hand-eye coordination, balance, and agility. These social interactions provide opportunities for children to explore and extend their motor skills in diverse settings, which cannot be fully addressed by parental stimulation alone.

This research further emphasises that parental physical literacy and children's social development are two-fold. Parental physical literacy provides an important foundation and framework for motor development, while social development provides a context for experimentation and motor skill growth (Lopes et al., 2021). This relationship suggests that efforts to enhance motor development in infants and toddlers should not target parents or children in isolation, but rather through enhancing children's networks of social relationships, including increased opportunities to participate in group activities or community-based education services.

The role of parental involvement in child motor development moderated by social development

The development of gross motor abilities, including running, jumping, and climbing, is aided by parental involvement, which involves actively participating in daily activities with the child (e.g., play, physical activity support, and exploration-based stimulation) (Flynn et al., 2023). Concurrently, children's perceptions of the quality of their motor exploration are directly influenced by parental skill, which is defined as the capacity of parents to guide their physical activity, establish a safe environment for play, and behave in accordance with developmental standards of healthy physical conduct. The present study's findings are corroborated by Paez et al. (2022), who found that parents not only offer emotional support when their children exercise, but also accelerate motor learning through setting a good example and providing direction.

Social development has been identified as a moderating variable that strengthens the relationship between parental involvement and motor development. In terms of parental involvement, children who demonstrate high levels of social development, as indicated by interacting with peers, sharing, and following rules during group activities, have been shown to have the most favourable responses (Chen et al., 2022). The possession of positive social skills, coupled with the capacity to discern and adhere to instructions from others, is conducive to the effective execution of a given motor skill (Yafie et al., 2020). Consequently, such children are well-positioned to engage in physical activities that necessitate interaction with their peers. Research by Jones et al. (2020) further elucidates that social development constitutes the foundation of motor learning. Children who demonstrate effective social skills will exhibit a greater propensity to engage in physical activities that necessitate collaboration with a group of children.

Furthermore, the capacity of parents to provide motor stimulation has been demonstrated to have a significant impact on their children's social development. For instance, children who possess innate social proficiency are more likely to receive cues and instruction from their parents, which in turn facilitates the acquisition of motor skills such as jumping to the beat or throwing a ball with precision. The study by Kuzik et al. (2020) in the ecological theory of child development refers to the way in which a child develops holistically, influenced by the environment (parents) and individual capacity (social development) to determine how a child will reach their full potential. This means that a child's motor skills depend on parental involvement as well as the child's own social adaptation (Bahri et al., 2023).

The role of social factors in supporting child motor development moderated by social development

This study posits that the developmental processes of young children's motor abilities are less influenced by social variables, such as social development, social standards, social security, and social support. This assertion is particularly pronounced when considering the impact of the child's social development. While acknowledging the role of social factors in children's development, the study's findings raise concerns about the sufficiency of these factors to influence motor skills independently, particularly when considering the challenges in establishing the predicted moderating effect on children's social development (Aubert et al., 2022). This suggests the possibility that social factors may be highly complex and that tangible variables such as social status may obscure their impact.

Social interactions have been demonstrated to exert an influence on a variety of developmental areas, including, but not limited to, children's language development and social skills (Yafie et al., 2020). The development of children's social behaviours has been shown to mediate these interactions. However, regarding motor development, the findings of this study suggest that although social interaction and involvement may potentially influence the manifestation of motor competence in children, the contribution of social development to moderate a substantive effect is not evidently successful. Concurrently, Jatnika et al. (2024) posit that social development exerts a positive influence on numerous domains of child development. However, they contend that additional factors, including age, the congruence between the nature of physical activity and the child's motor proficiency, and the calibre of social interaction, collectively contribute significantly to the outcomes observed in motor development.

The present study posits that the absence of social norms' influence on children's motor development may be attributable to children's failure to internalise social norms to the extent that they encourage physical activity (Estevan et al., 2021). This is predicated on the premise that children may elect to abstain from physical activities prescribed by social norms when they experience a sense of disconnection from those norms, or when they perceive the activity to be futile. Consequently, it is imperative to identify and promote fitness activities that can be performed to enhance health outcomes. In addition, factors such as children's intrinsic motivation, parental experiences, and the school environment may exert a more significant influence on children's decisions regarding participation in motor behaviours than social standards alone (Lohbeck et al., 2021).

Social reassurance and social support, which are typically regarded as pivotal components of a child's developmental milieu, have been observed to exert a negligible influence on motor outcomes. While a child may be inclined to engage in novel activities in the presence of family and friends, who provide a secure and nurturing environment conducive to exploration, there is often an absence of a discernible change in motor development as a direct consequence of these social influences (Reedman et al., 2021). Research by Andriyani et al. (2020) found that while social support is important for emotional and social development, internal factors including children's interests and level of engagement in motor activities are more influential in developing motor skills.Therefore, although social factors are usually beneficial to children's development, the direct implications of social factors on children's motor development are more complex and moderated by various other elements.

Conclusions

The findings of this study demonstrate that a child's social development moderates the effect of parental physical literacy and early physical activity on the child's motor development.The development of motor skills in children is accelerated when their parents are actively involved in their lives. This is due to the fact that children who possess strong social skills also have a solid foundation of encouraging physical literacy from their parents. The impact of social factors on children's motor abilities was determined to be insignificant, even when controlling the child's social development.These elements include social norms, social security, and social support, all of which are crucial in children's overall development.Therefore, for optimal motor development, it is crucial that parents are physically literate, actively involved in their children's lives, and pay attention to how their children are doing socially. The findings of this study imply that parents may benefit from physical literacy training and resources, enabling them to assume a more active role in encouraging their children to participate in physical activities.Group activities that promote children's engagement with their classmates are also deemed crucial for their social development, given that these activities can amplify the beneficial effects of parental participation. The practical implications of this study are that parents and educators should incorporate structured physical activity into children's daily routines, while also encouraging social interactions in a variety of settings, such as playgroups or the school environment.Schools and early childhood centers can implement programs that promote both motor skill development and social engagement, ensuring a more holistic approach to child development. Parental physical literacy workshops or community programs can also be beneficial in providing parents with the knowledge and skills needed to effectively support their children's motor and social development.

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