



Physical activity engagement, social interaction, and emotional regulation skills of kindergarteners

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Received: 16 February 2026

Revised: 18 March 2026

Accepted: 24 March 2026

Available Online: 30 March 2026

Volume 1 (2026), Issue 1, P-ISSN – 3116-3882; E-ISSN - 3116-3890

<https://doi.org/10.63498/ijshefms1>

Abstract

Aim: This study examined how physical activity engagement and social interaction skills influence emotional regulation among kindergarten learners in public elementary schools, highlighting the role of movement-based experiences in early childhood development.

Methodology: A predictive correlational research design was employed involving 136 kindergarten learners from four public elementary schools during the School Year 2025–2026. Data were collected using a validated structured questionnaire measuring physical activity engagement (aerobic, muscle-strengthening, bone-strengthening, and balance activities), social interaction skills (emotions, aggression management, and stress management), and emotional regulation skills (integrative regulation, suppressive regulation, and emotional flexibility). Statistical tools included frequency, weighted mean, standard deviation, Pearson correlation, and multiple regression analysis.

Results: Findings revealed that kindergarten learners demonstrated a high level of physical activity engagement, with bone-strengthening activities obtaining the highest mean. Social interaction skills were also rated high, particularly stress management skills. Emotional regulation skills were likewise high, with emotional flexibility emerging as the strongest dimension. Correlation analysis showed that social interaction skills had a significant moderate relationship with emotional regulation, while aerobic and muscle-strengthening activities also demonstrated significant associations. Regression analysis further indicated that social interaction skills were the strongest predictor of emotional regulation among kindergarten learners.

Conclusion: Emotional regulation among kindergarten learners was significantly influenced by opportunities for social interaction and movement-based activities in classroom environments. Integrating structured physical play and socio-emotional learning strategies in early childhood education can strengthen children's emotional competence and support holistic development, highlighting the importance of movement-based learning in promoting health, physical engagement, and emotional well-being among young learners.

Keywords: *emotional regulation, physical activity, movement-based learning, social interaction, early childhood education, kindergarten learners*

INTRODUCTION

Early childhood is widely regarded as a critical stage in human development because fundamental cognitive, social, and emotional competencies are established during the first years of life. Neuroscientific evidence indicates that nearly ninety percent of brain development occurs before the age of five, highlighting the importance of early educational experiences in shaping children's emotional behavior, social relationships, and learning readiness (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2024). Early childhood education therefore plays a vital role in nurturing competencies that support lifelong learning and well-being.

One essential competency that develops during this stage is emotional regulation. Emotional regulation refers to children's ability to recognize emotional states, manage impulses, and express emotions in socially appropriate ways. Kindergarteners who develop strong emotional regulation demonstrate better classroom engagement, improved peer relationships, and greater academic readiness (Menefee et al., 2022). Emotional regulation also enables children to respond constructively to frustration and adapt to classroom routines.



International Journal of Sports, Health, Fitness, and Movement Studies (IJSHEFMS)

National Book Development Board (NBDB) Registration as Book
Publisher (Print & Digital): 6312

PRC-CPD Accredited
Provider: PTR-2025-749

Print ISSN: 3116-3882
Electronic ISSN: 3116-3890

Movement experiences have been recognized as one factor contributing to emotional development. Physical activity stimulates executive functioning processes that support self-regulation, including attention control and inhibitory regulation (Vazou & Mavilidi, 2021). Active play also contributes to emotional well-being by reducing stress and promoting positive mood among young learners (Liu et al., 2025). These processes support children's ability to regulate emotions during challenging situations. Social interaction is another important developmental mechanism influencing emotional competence. Through peer engagement and collaborative play, children experience situations that require empathy, cooperation, and behavioral adjustment. These interactions provide opportunities to practice emotional control and perspective-taking. Research indicates that children who frequently engage in cooperative learning environments demonstrate stronger emotional competence and social understanding (Fu et al., 2025).

The importance of emotional regulation in early childhood education aligns with Sustainable Development Goal 4 (Quality Education), which emphasizes inclusive and equitable learning opportunities that support children's cognitive and socio-emotional development (United Nations International Children's Emergency Fund [UNICEF], 2023). Quality early childhood education programs that integrate physical activity and social learning contribute to children's holistic development and educational readiness.

In the Philippine context, several national frameworks emphasize holistic child development. The Kindergarten Education Act of 2012 (Republic Act 10157) institutionalized kindergarten as the compulsory entry stage of basic education. The Early Years Act of 2013 (Republic Act 10410) strengthened integrated services supporting children's developmental needs. The K to 12 Basic Education Curriculum promotes play-based learning experiences that support cognitive, social, and emotional growth. Recent initiatives such as the Department of Education (DepEd) MATATAG Curriculum emphasize strengthening foundational learning competencies and learner well-being.

Despite these policies, contemporary childhood experiences are increasingly influenced by digital technologies that may reduce opportunities for active play and direct social interaction. Increased screen exposure has been associated with sedentary behavior and limited peer engagement among young children (Webb, 2023). This trend presents a critical concern in sports science, physical education, and public health, as reduced physical activity levels may negatively affect both physical health and emotional regulation development among early learners. Existing research often examines physical activity and social interaction independently. Limited research investigates how these variables interact to influence emotional regulation among kindergarten learners. Addressing this gap is important in understanding how early childhood learning environments can better support socio-emotional development. This study therefore examined the relationship between physical activity engagement, social interaction skills, and emotional regulation among kindergarten learners in public elementary schools, with the aim of contributing to the fields of physical education pedagogy, movement studies, and early childhood health promotion.

Review of Related Literature and Studies

This review of related literature presents empirical studies related to physical activity engagement, social interaction skills, and emotional regulation among kindergarten learners. It establishes the basis for understanding how these variables influence kindergarteners' emotional development.

Physical Activity Engagement

Physical activity engagement plays a vital role in early childhood development by stimulating physiological and cognitive processes that support self-regulation. Children participate in aerobic activities, such as running and active play, which enhance cardiovascular functioning and emotional stability (Vazou & Mavilidi, 2021). Muscle-strengthening activities, including climbing and lifting, promote persistence, body control, and behavioral regulation (León-Reyes et al., 2025). Bone-strengthening activities, such as jumping and hopping, support skeletal development and active exploration (McCaskie et al., 2022), while balance activities develop coordination and attentional focus that contribute to emotional regulation (Esen et al., 2023).

Social Interaction Skills

Social interaction skills are a crucial component of children's development, as peer engagement provides opportunities to practice emotional understanding and behavioral adjustment. In kindergarten settings, children develop social skills related to emotions by recognizing and expressing feelings and responding empathetically during cooperative activities (Gao et al., 2023). They also acquire aggression management skills through communication, sharing, and conflict resolution, promoting positive classroom interactions (Fu et al., 2025). In addition, stress management skills enable children to cope with frustration, adapt to classroom expectations, and seek support when needed. Classrooms that emphasize collaborative play and peer interaction further strengthen emotional control and interpersonal competence through meaningful social experiences (Thümmler et al., 2022).



Emotional Regulation Skills

Emotional regulation refers to children's ability to understand emotional experiences and manage behavior in socially appropriate ways. It includes integrative regulation, where children recognize and express emotions constructively during interactions (D'Cruz et al., 2024); suppressive regulation, which involves controlling impulsive reactions during frustration or conflict, particularly when supported by appropriate learning environments (Liu et al., 2025); and emotional flexibility, which enables children to adjust emotional responses and recover from negative experiences. Children with strong emotional flexibility demonstrate better peer relationships and adaptive behavior in learning settings (Menefee et al., 2022).

Relationship between Emotional Regulation, Physical Activity Engagement, and Social Interaction Skills

Emotional regulation develops through the interaction of physical activity and social experiences. Movement-based activities enhance executive functioning and emotional control, while social interaction provides opportunities for practicing empathy, cooperation, and self-regulation (Jiang et al., 2025; Gao et al., 2023). This interaction highlights the importance of integrating movement and social engagement in learning environments, as emphasized in movement studies.

Predictors of Emotional Regulation Skills

Social experiences and movement-based learning are key factors influencing emotional regulation among young learners. Cooperative interaction enhances emotional awareness and behavioral control, while movement-based activities strengthen executive functions that support emotional management (Thümmler et al., 2022; Jiang et al., 2025). Despite these findings, limited empirical research in the Philippine context has examined how physical activity engagement and social interaction jointly predict emotional regulation among kindergarten learners, highlighting the need for the present study. Addressing this gap contributes to movement studies by advancing understanding of integrated developmental processes, to physical education by informing developmentally appropriate, play-based instructional practices, and to health promotion by supporting strategies that enhance children's emotional well-being through active and socially engaging environments.

Theoretical Framework

This study was anchored on developmental theories explaining how physical activity engagement and social interaction contribute to children's emotional development. These theories emphasize that learning occurs through active engagement with the environment and meaningful interaction with others. Early childhood scholars suggest that play, movement, and collaboration provide important contexts for developing emotional competence among young learners. Friedrich Froebel's Theory of Play emphasizes that play allows children to explore their environment and express emotions through meaningful experiences (Froebel, 1887). Through physical movement and social play, children practice self-control, cooperation, and emotional expression in early learning settings. Jean Piaget's Cognitive Development Theory explains that children in the preoperational stage construct knowledge through active exploration and interaction with their surroundings (Piaget, 1952). Physical play helps children interpret emotional experiences and develop understanding of social relationships. Lev Vygotsky's Social Development Theory highlights that social interaction supports children's cognitive and emotional development through guided learning (Vygotsky, 1978). Bronfenbrenner's Ecological Systems Theory further explains that children's development is influenced by interactions within family, school, and community environments (Bronfenbrenner, 1979). In addition to these developmental theories, the study draws on the Physical Literacy Framework (Gleddie & Morgan, 2020), which emphasizes the holistic development of movement competence, confidence, and motivation among children, highlighting that physical activity supports not only physical fitness but also emotional regulation and social interaction. These perspectives guided the present study in examining how physical activity engagement and social interaction skills contribute to the emotional regulation of kindergarten learners.

Conceptual Framework

This study examined the influence of physical activity engagement and social interaction skills on emotional regulation among kindergarten learners. The independent variables included physical activity engagement and social interaction skills. Physical activity engagement consisted of aerobic activities, muscle-strengthening activities, bone-strengthening activities, and balance activities. Social interaction skills included emotions, aggression management skills, and stress management skills. The dependent variable was emotional regulation skills, measured in terms of integrative regulation, suppressive regulation, and emotional flexibility.



The framework proposes that increased engagement in movement-based activities and social interaction experiences enhances kindergarteners' emotional regulation skills.

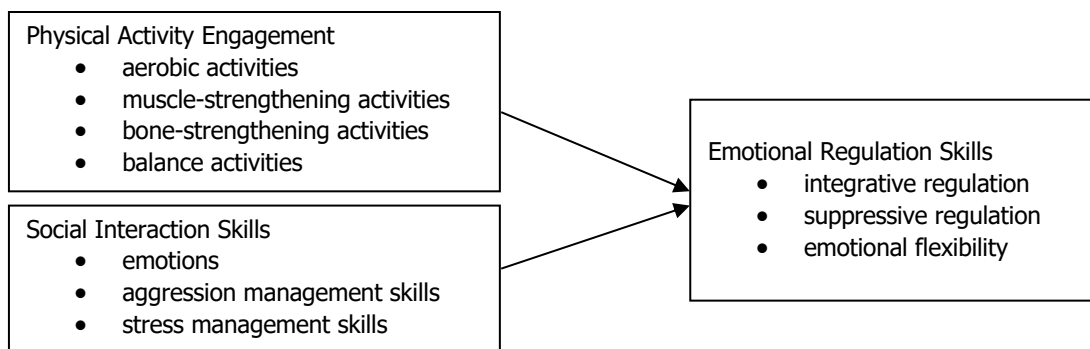


Figure 1

The schematic presentation showing the relationship between the independent and dependent variables.

Statement of the Problem

Physical activity and social interaction are essential to children's socio-emotional development, especially in early childhood when foundational behavioral and emotional competencies are formed. Movement-based activities such as running, jumping, climbing, and cooperative play support emotional regulation, interpersonal skills, and active learning. However, increasing exposure to sedentary lifestyles and digital technologies may reduce opportunities for active play and meaningful peer interaction, raising concerns about emotional regulation among young learners. While previous studies have examined physical activity and social interaction separately, limited research has explored their combined influence on emotional regulation among kindergarten learners, particularly in Philippine public elementary schools. Understanding these relationships is important for educators and practitioners seeking to design movement-based learning environments that support children's emotional competence, health, and holistic development. This study therefore investigated the relationship between physical activity engagement, social interaction skills, and emotional regulation among kindergarten learners in public elementary schools.

Research Objectives

General Objective

To examine the relationship and predictive influence of physical activity engagement and social interaction skills on the emotional regulation of kindergarten learners.

Specific Objectives

1. To determine the level of physical activity engagement among kindergarten learners in terms of:
 - 1.1 aerobic activities;
 - 1.2 muscle-strengthening activities;
 - 1.3 bone-strengthening activities; and
 - 1.4 balance activities.
2. To assess the level of social interaction skills among kindergarten learners in terms of:
 - 2.1 social skills related to emotions;
 - 2.2 aggression management skills; and
 - 2.3 stress management skills.
3. To evaluate the level of emotional regulation skills among kindergarten learners in terms of:
 - 3.1 integrative regulation;
 - 3.2 suppressive regulation; and
 - 3.3 emotional flexibility.
4. To examine the significant relationship between kindergarten learners' emotional regulation skills and their:
 - 4.1 physical activity engagement; and
 - 4.2 social interaction skills.



5. To determine which variables, singly or in combination, significantly predict kindergarten learners' emotional regulation skills.

Research Questions

1. What is the level of physical activity engagement among kindergarten learners in terms of:
 - 1.1 aerobic activities;
 - 1.2 muscle-strengthening activities;
 - 1.3 bone-strengthening activities; and
 - 1.4 balance activities?
2. What is the level of social interaction skills among kindergarten learners in terms of:
 - 2.1 social skills related to emotions;
 - 2.2 aggression management skills; and
 - 2.3 stress management skills?
3. What is the level of emotional regulation skills among kindergarten learners in terms of:
 - 3.1 integrative regulation;
 - 3.2 suppressive regulation; and
 - 3.3 emotional flexibility?
4. Is there a significant relationship between kindergarten learners' emotional regulation skills and their:
 - 4.1 physical activity engagement; and
 - 4.2 social interaction skills?
5. Which variables, singly or in combination, significantly predict kindergarten learners' emotional regulation skills?

Null Hypothesis (H₀)

There is no significant relationship between physical activity engagement, social interaction skills, and emotional regulation among kindergarten learners.

METHODS

Research Design

This study employed a predictive-correlational research design, a quantitative approach used to examine relationships among variables and determine predictors of a particular outcome. The design was appropriate because the study investigated how physical activity engagement and social interaction skills predict emotional regulation among kindergarten learners. This approach enabled the researcher to analyze naturally occurring behaviors without manipulating classroom conditions. It also allowed the identification of statistically significant relationships and predictive variables influencing emotional regulation.

Population and Sampling

The respondents of the study were kindergarten learners enrolled in selected public elementary schools in a district in Misamis Oriental during the School Year 2025–2026. The total population consisted of 209 kindergarten learners, from which a sample of 136 respondents was determined using Cochran's sampling formula to ensure statistical adequacy. The study employed proportionate stratified random sampling to ensure fair representation of learners from the participating schools. This sampling technique helped improve the reliability of the collected data.

Instruments

The study utilized an adapted and researcher-developed structured questionnaire to assess physical activity engagement, social interaction skills, and emotional regulation among kindergarten learners. Items were adapted from Benita et al. (2019) for emotional regulation, the Buss–Perry Aggression Questionnaire (Buss & Perry, 1992) for aggression control, and supported by social skills frameworks (Rodriguez-Macaya et al., 2021; Goldstein et al., 1983). The instrument consisted of 97 items distributed across physical activity engagement (32 items: aerobic, muscle-strengthening, bone-strengthening, and balance activities), social interaction skills (30 items: social skills related to emotions, aggression management, and stress management), and emotional regulation skills (35 items: integrative, suppressive, and emotional flexibility). Sample indicators included: "I like running and playing tag with my friends" for physical activity engagement, "I tell others how I feel in a nice way" for social interaction skills, and "I can stay



calm even when things suddenly change” for emotional regulation skills. These indicators were developmentally and age-appropriate, allowing learners to reflect on their own behavior and respond based on real-life experiences. All items were measured using a five-point Likert scale and administered through a teacher-assisted approach, with simplified, translated (Cebuano), and emoji-supported items to ensure comprehension. The instrument underwent content and face validation by three experts in early childhood education and research. Reliability testing yielded a Cronbach’s Alpha of .81 and McDonald’s Omega of .84, indicating acceptable internal consistency and supporting its suitability for data collection.

Data Collection

Data collection was conducted during the Second Quarter of the School Year 2025–2026 after securing approval from the Schools Division Office and school administrators. The researcher coordinated with kindergarten teachers to facilitate the administration of the questionnaires within the classroom setting. Clear instructions were provided to ensure that the learners understood the items and responded appropriately. Completed questionnaires were collected immediately and checked for completeness before data analysis.

Treatment of Data

The collected data were analyzed using appropriate statistical techniques to address the research objectives. Frequency and percentage were used to describe the profile of the respondents. The weighted mean and ranking were used to determine the level of physical activity engagement, social interaction skills, and emotional regulation skills. Pearson Product-Moment Correlation was applied to determine the relationship among the variables, while multiple regression analysis identified which variables significantly predicted emotional regulation skills. Statistical tests were conducted at a 0.05 level of significance ($\alpha = 0.05$).

Ethical Considerations

Ethical standards were strictly observed throughout the research process. Ethics approval was obtained from the institution’s review board prior to data collection. An informed consent was secured from parents or guardians prior to the participation of the learners. In addition, a child assent form was obtained using age-appropriate explanations to ensure voluntary participation. Confidentiality and anonymity were maintained by ensuring that the identities of both the respondents and the participating schools were not disclosed, and all collected data were used solely for academic purposes in accordance with the Data Privacy Act of 2012 (Republic Act No. 10173).

RESULTS and DISCUSSION

This section provides the results and discussion on the data gathered from the survey questionnaires to determine the relationship and predict the influence of physical activity engagement, social interaction, and emotional regulation skills of kindergarten learners.

1. Level of Physical Activity Engagement among Kindergarten Learners

The findings revealed that kindergarten learners demonstrated a high level of physical activity engagement, with an overall mean of 3.92, indicating frequent participation in movement-based play that supports their physical growth and development. Despite increasing exposure to digital devices, children remain actively engaged in physical play when provided with supportive learning environments, with bone-strengthening activities ranking highest (4.11) through movements such as jumping, hopping, and running. These activities not only strengthen the skeletal system but also promote emotional well-being by helping regulate mood and reduce stress (World Health Organization, 2024).

Table 1

Level of Physical Activity Engagement among Kindergarten Learners

Indicators	WM	VI	Rank
Aerobic Activities	3.88	High	2
Muscle-strengthening Activities	3.84	High	4
Bone-strengthening Activities	4.11	High	1
Balance Activities	3.87	High	3
Composite Mean	3.92	High	

Legend: 4.51-5.00 Very High, 3.51-4.50 High, 2.51-3.50 Moderately High, 1.51-2.50 Low, 1.00-1.50 Very Low



Aerobic activities ranked second with a mean of 3.88, indicating that learners frequently engage in dynamic movements such as running, dancing, and chasing games that enhance cardiovascular health, attention, and emotional regulation. From a health promotion and sports science perspective, regular aerobic movement supports cognitive processes related to focus and emotional control, reinforcing the role of active play in early childhood development (Pan & Lu, 2024; Morales et al., 2024).

Meanwhile, balance activities ranked third with a mean of 3.87, reflecting consistent participation in coordination-based movements that strengthen postural stability, spatial awareness, and social interaction—key foundations for lifelong physical activity and holistic health (Esen et al., 2023). Muscle-strengthening activities obtained the lowest mean (3.84), although still interpreted as High, indicating continued participation in activities such as climbing, pushing, and lifting. The slightly lower engagement may be attributed to limited facilities or increased screen exposure; however, these activities remain important for improving posture, muscular endurance, and physical confidence among young learners (Webb, 2023).

The findings highlighted the critical role of movement-based activities in promoting physical development, emotional regulation, social interaction, and overall health. These activities also encourage peer interaction and help children manage frustration and build resilience (Moreira et al., 2023; World Health Organization, 2024).

2. Level of Social Interaction Skills among Kindergarten Learners

Among the indicators of the level of social interaction skills among kindergarten learners, stress management skills ranked first with a weighted mean of 3.84, indicating that kindergarten learners demonstrated early coping behaviors during frustration and minor conflicts. Learners were able to calm themselves, communicate their needs, and seek support from teachers or peers, reflecting the role of supportive classroom environments in promoting constructive coping strategies. Peer engagement further enhances emotional awareness and communication, strengthening emotional competence and self-regulation in early childhood (Gao et al., 2023).

Table 2
Level of Social Interaction Skills among Kindergarten Learners

Indicators	WM	VI	Rank
Emotions	3.67	High	2
Aggression Management Skills	3.67	High	3
Stress Management Skills	3.84	High	1
Composite Mean	3.72	High	

Legend: 4.51-5.00 Very High, 3.51-4.50 High, 2.51-3.50 Moderately High, 1.51-2.50 Low, 1.00-1.50 Very Low

In the second rank was emotions, which obtained a weighted mean of 3.67, indicating that learners can appropriately express feelings and recognize emotional cues during peer interactions. This level of emotional awareness supports the development of empathy and sensitivity toward others. Research reveals that children who can effectively identify and communicate emotions demonstrate stronger social competence and healthier peer relationships (Menefee et al., 2022). Aggression management skills ranked third, which also obtained a weighted mean of 3.67, reflecting learners' ability to control impulsive responses and resolve conflicts through communication rather than aggression. Cooperative play environments further promote negotiation, empathy, and emotional control, reinforcing positive social behaviors (Fu et al., 2025). The overall composite mean of 3.72 (High) highlights that kindergarten learners generally exhibit strong social interaction skills supported by collaborative classroom settings. From a health promotion perspective, these findings emphasize the importance of developing socio-emotional competencies early, as they contribute to children's overall well-being, resilience, and healthy social development.

3. Level of Emotional Regulation Skills among Kindergarten Learners

Among the indicators of emotional regulation skills, emotional flexibility ranked first with a weighted mean of 3.98, verbally interpreted as High. This finding indicated that kindergarten learners were able to adjust emotional responses when encountering different situations in the classroom or during play. Emotional flexibility allows children to recover from frustration, adapt to changes, and maintain positive relationships with peers. This study suggests that children who experienced supportive learning environments develop stronger emotional coping strategies and adaptive emotional responses. Emotional flexibility is widely recognized as a critical



component of emotional competence because it enables children to manage emotional reactions effectively. Research indicated that children with higher emotional flexibility demonstrate better social adjustment, stronger peer relationships, and improved psychological well-being (Lüken et al., 2025).

Table 3

Level of Emotional Regulation Skills among Kindergarten Learners

Indicators	WM	VI	Rank
Integrative Regulation	3.76	High	2
Suppressive Regulation	3.65	High	3
Emotional Flexibility	3.98	High	1
Composite Mean	3.79	High	

Legend: 4.51-5.00 Very High, 3.51-4.50 High, 2.51-3.50 Moderately High, 1.51-2.50 Low, 1.00-1.50 Very Low

In the second rank was integrative regulation, which obtained a weighted mean of 3.76, verbally interpreted as High. This indicated that learners were able to recognize and express emotions while maintaining appropriate behavior in social situations. Integrative regulation encourages healthy emotional expression and helps children develop constructive communication skills when interacting with peers and teachers. These behaviors reflect the developing ability of young learners to balance emotional responses with cognitive understanding during social interactions. Studies showed that children who engage in integrative emotional regulation tend to develop strong social relationships and exhibit greater emotional stability within learning environments (Thümmeler et al., 2022).

Ranking third was suppressive regulation, which obtained a weighted mean of 3.65, verbally interpreted as High. This suggests that learners were able to control emotional reactions when necessary, particularly during structured classroom activities. While emotional suppression may help maintain order in certain situations, balanced emotional expression remains important for healthy emotional development. The composite mean of 3.79, interpreted as High, indicates that kindergarten learners demonstrate strong emotional regulation skills. These findings highlight the importance of early childhood environments that provide opportunities for emotional expression, social interaction, and guided learning experiences that strengthen children's socio-emotional competence (Ma et al., 2024).

4. Relationship between Kindergarteners' Emotional Regulation Skills, Physical Activity Engagement, and Social Interaction Skills

Among the examined variables, social interaction skills demonstrated the strongest relationship with emotional regulation skills among kindergarten learners. The overall social interaction skills obtained the highest correlation coefficient ($r = .471$, $p = .001$), indicating a moderate positive relationship. This finding suggests that children who frequently engaged in cooperative interaction, emotional communication, and peer collaboration tend to exhibit stronger emotional regulation skills. Social interaction provides opportunities for children to practice emotional awareness, empathy, and behavioral control during real-life situations. Through guided interactions with peers and adults, children gradually develop the capacity to manage emotional responses and resolve conflicts constructively. Studies indicated that peer interaction and cooperative play significantly contribute to the development of emotional competence and self-regulation during early childhood (Gao et al., 2023).

Table 4

Significant Relationship between Kindergarteners' Emotional Regulation Skills, Physical Activity Engagement, and Social Interaction Skills

Constructs	N	R	P-value	Interpretation
Aerobic Activities	136	.175	.042	Significant
Muscle-strengthening Activities	136	.191	.026	Significant
Bone-strengthening Activities	136	-.064	.457	Not Significant
Balance activities	136	.074	.392	Not Significant
Overall Physical Activity Engagement	136	.142	.099	Not Significant
Emotions	136	.493	.001	Significant
Aggression Management Skills	136	.490	.001	Significant
Stress Management Skills	136	.177	.040	Significant
Overall Social Interaction Skills	136	.471	.001	Significant

Legend: $\alpha = 0.05$; $p < .05$ = significant, $p > .05$ = not significant



Correlation Coefficient Range-Level of Correlation/Effect Size (Cohen, 1988), .50 and Above Strong Correlation/Large Relationship, .30 to .49 Moderate Correlation/Medium Relationship, .10 to .29 Weak/Small Relationship

Muscle-strengthening activities showed the highest correlation with emotional regulation ($r = .191, p = .026$), followed closely by aerobic activities ($r = .175, p = .042$), indicating that sustained movement and muscular effort support better emotional control among young learners. Activities such as running, climbing, and pushing objects helped children release energy while developing persistence, self-confidence, and emotional stability. Movement-based activities stimulate physiological processes that enhance mood, reduce stress, and strengthen cognitive control (Moreira et al., 2023; Pan & Lu, 2024). These findings highlighted the importance of integrating structured and active play in early childhood education as part of health promotion efforts. On the other hand, bone-strengthening and balance activities did not show a significant relationship with emotional regulation, and overall physical activity engagement was also not statistically significant. The study suggests that not all forms of movement equally influence emotional outcomes, emphasizing the need for targeted and purposeful activity design. Studies further indicate that combining physical activity with social interaction and collaborative play enhances developmental benefits, supporting holistic growth and well-being among children (Morales et al., 2024).

All sub-variables of social interaction skills showed significant positive relationships with emotional regulation, with emotion recognition and expression ($r = .493, p = .001$) and aggression management ($r = .490, p = .001$) demonstrating the strongest correlations. These findings indicated that children who can understand emotions, express feelings, and manage conflicts effectively are better at regulating their emotional responses. Social interactions provide meaningful opportunities for practicing emotional control through sharing, cooperation, and conflict resolution, reinforcing emotional competence through immediate feedback from peers and teachers (WenLi, 2025; Gao et al., 2023). From a health promotion and behavioral science perspective, these results highlighted the critical role of structured social environments, cooperative play, and positive teacher-child relationships in cultivating emotional well-being and resilience (D'Cruz et al., 2024). Thus, the null hypothesis is rejected, indicating a significant relationship between kindergarteners' emotional regulation skills and selected aspects of physical activity engagement and social interaction skills.

5. Predictors of Emotional Regulation Skills among Kindergarten Learners

Among the variables examined, overall social interaction skills emerged as the strongest predictor of emotional regulation among kindergarten learners, as evidenced by the highest beta coefficient. The study revealed that children who actively engage in communication, cooperation, and conflict management develop stronger emotional control through meaningful, real-life social experiences. Furthermore, studies highlighted that social interaction significantly strengthens emotional competence because children repeatedly practice emotional management during social interactions (Gao et al., 2023).

Table 5
Multiple Regression Analysis Predicting Kindergarteners' Emotional Regulation Skills from Physical Activity Engagement and Social Interaction Skills

Predictors	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Interpretation
	B	Std. Error	Beta			
(Constant)	1.822	.378		4.819	.001	
Aerobic Activities	.263	.078	.265	3.375	.001	Significant
Muscle-strengthening Activities	.160	.052	.228	3.101	.002	Significant
Bone-strengthening Activities	-.155	.056	-.225	-2.785	.006	Significant
Balance Activities	.061	.047	.103	1.318	.190	Not Significant
Stress Management Skills	-.141	.050	-.276	-2.795	.006	Significant
Overall Social Interaction Skills	.343	.051	.620	6.780	.001	Significant
$R = .596, R^2 = .355, F(6, 129) = 11.84, p < .001$						

Aerobic and muscle-strengthening activities significantly predicted emotional regulation skills among kindergarten learners. Children who frequently engage in movements such as running and climbing demonstrate stronger emotional control, as these activities allow them to release energy and regulate physiological responses



linked to stress and mood. From a health and sports science perspective, active play enhances emotional well-being and behavioral regulation by improving attention and impulse control (Moreira et al., 2023; Pan & Lu, 2024). On the other hand, balance activities did not significantly predict emotional regulation, suggesting that while they support motor coordination and physical development, they may offer fewer opportunities for practicing emotional control. These findings highlight that the emotional benefits of physical activity are maximized when movement is purposeful, dynamic, and integrated with opportunities for social interaction and engagement. Furthermore, social interaction skills contributed substantially to emotional regulation, highlighting the critical role of peer engagement in early childhood learning environments. Children who effectively communicate emotions, manage conflicts, and cope with stress during social interactions develop stronger emotional regulation abilities. Supportive classroom environments further enhance these skills by guiding children to refine emotional responses and build positive peer relationships (WenLi, 2025; Gao et al., 2023). The regression model explains 35.5% of the variance in emotional regulation skills, indicating that both physical activity engagement and social interaction skills contribute to children's emotional development. However, social interaction skills demonstrate a stronger influence, emphasizing the importance of cooperative play and supportive social environments in early childhood education. These findings underscore the importance of integrating movement-based learning and interactive play in kindergarten settings to promote emotional regulation and overall well-being among young learners. Moreover, these findings reinforce the role of physical literacy as a foundation for integrating movement, social interaction, and emotional development in early childhood education.

Conclusions

The findings indicated that kindergarten learners demonstrated high engagement in physical activity, strong social interaction skills, and well-developed emotional regulation skills. Social interaction skills emerged as the strongest predictor of emotional regulation, emphasizing the critical role of peer engagement and collaborative learning in early childhood development. While physical activity contributed to emotional regulation, its impact is enhanced when integrated with social interaction. These results underscore the importance of movement-based and socially interactive learning environments in promoting emotional competence, physical literacy, and holistic child development. Furthermore, the findings highlight the importance of physical literacy as a foundation for integrating movement, social interaction, and emotional development in early childhood education.

Recommendations

Based on the findings and conclusions of the study, the following recommendations are proposed:

1. The **Department of Education (DepEd)** may strengthen the integration of structured aerobic and muscle-strengthening activities within the kindergarten curriculum by providing developmentally appropriate play environments that promote active participation and peer interaction.
2. **School administrators** may enhance early childhood programs by ensuring access to safe and well-equipped play facilities that support both movement-based learning and socio-emotional development.
3. **Kindergarten teachers** may incorporate cooperative play, guided movement activities, and emotion-focused learning strategies in classroom instruction to enhance learners' social competence and emotional regulation.
4. **Parents and caregivers** may support children's development by encouraging daily active play and cooperative interaction at home while reinforcing simple emotion-labeling and emotional communication practices.
5. **Future researchers** may further examine the long-term effects of physical activity engagement and social interaction on children's emotional regulation, including the influence of classroom environments, teaching strategies, and school facilities.

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