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Traditional Rubber Jumping Game as a Play-Based Intervention to Improve Fine and Gross Motor Development in Early Childhood: Evidence from Two Classroom Action Research Cycles

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ABSTRACT

Purpose of the study: This study aimed to investigate the effectiveness of the rubber jumping game (permainan lompat karet), a traditional Indonesian game, in enhancing both fine and gross motor skills among Group B children (aged 5–6 years) at RA Asiah Pekanbaru, Riau Province, Indonesia.

Materials and methods: A classroom action research (CAR) design was employed across two cycles, involving 10 participants (6 males, 4 females). Data were collected through direct observation using structured observation sheets with a four-point developmental rating scale (BB, MB, BSH, BSB). Quantitative descriptive and qualitative analyses were applied to evaluate children's motor development progression across pre-cycle, Cycle I, and Cycle II phases.

Results: Pre-intervention assessment revealed critically low mean scores for fine motor skills (6.00%) and gross motor skills (6.10%). Following Cycle I, fine motor scores increased to 12.00% and gross motor scores to 9.00%. After Cycle II, substantial improvements were observed with fine motor scores reaching 20.60% and gross motor scores reaching 18.40%. Classical learning completeness achieved 80%, categorized as "very high" based on established success criteria. By Cycle II, 70% of children attained "Developing Very Well" (BSB) status for both motor domains.

Conclusions: The rubber jumping game demonstrated significant efficacy in enhancing both fine and gross motor skills in early childhood settings. The integration of traditional games into the early childhood education curriculum offers a culturally relevant, cost-effective, and enjoyable pedagogical strategy for holistic motor development.

Keywords
fine motor skills; gross motor skills; rubber jumping game; traditional games; early childhood education; classroom action research.

INTRODUCTION

Early childhood represents a critical period for the acquisition of fundamental motor competencies that serve as the foundation for subsequent physical, cognitive, and social development (Hurlock, 2013; Piek et al., 2008). Motor development during the preschool years, commonly referred to as the "golden age," is characterized by rapid neurological maturation and the emergence of both fine and gross motor capabilities (Ghassabian et al., 2016; Sutapa et al., 2021). Fine motor skills, encompassing the coordinated use of small muscles in the hands and fingers for precise movements, and gross motor skills, involving the utilization of large muscle groups for locomotor activities, constitute two interdependent dimensions of physical development that are essential for children's holistic growth (Cameron et al., 2012; Escolano-Pérez et al., 2020).

The Indonesian Ministry of Education and Culture Regulation Number 137 of 2014 concerning the National Standards for Early Childhood Education delineates specific developmental achievement standards for gross motor development in children aged 5–6 years. These standards encompass balance, flexibility, agility, coordinated movement patterns, physical game participation, and bilateral hand coordination (Organisasi, 2014). However, achieving these developmental benchmarks requires deliberate pedagogical interventions that are both developmentally appropriate and engaging for young learners (Rahmadani et al., 2018).

The literature on motor development in early childhood has established that play-based learning constitutes one of the most effective pedagogical approaches for promoting physical development. Piaget's constructivist theory emphasizes that children learn through active engagement with their environment, and play provides the optimal context for such engagement (Sujiono et al., 2010). Vygotsky's sociocultural theory further posits that social interaction during play facilitates cognitive and motor development within the zone of proximal development (Singh et al., 2024). Traditional games, as culturally embedded play activities, integrate physical movement, social interaction, rule-following, and cognitive engagement, making them particularly potent developmental tools (Hasanah, 2016; Tan et al., 2020).

Contemporary research has demonstrated the efficacy of traditional games in enhancing motor skills across diverse cultural contexts. Rahmadani et al. (2018) found that the traditional "engklek" game significantly improved basic motor skills in kindergarten children. Wang & Zhou (2024) conducted a meta-analysis confirming that motor development-focused exercise training, including structured play activities, yields superior outcomes compared to unstructured free play. (Tan et al., 2020) reported that preschool children participating in traditional games showed significant improvements in balance and overall motor skills, with the traditional games group outperforming the free play group in manual dexterity.

Despite this growing body of evidence, a critical research gap persists regarding the specific impact of the rubber jumping game (permainan lompat karet)—a traditional Indonesian game—on both fine and gross motor development in early childhood settings. While previous studies have investigated various traditional games (Santoso et al., 2024; Yulianto et al., 2025), the dual impact of the rubber jumping game on both motor domains remains inadequately explored. Furthermore, limited empirical research has examined this game's applicability within Islamic kindergarten (Raudhatul Athfal) contexts, where curriculum integration presents unique challenges and opportunities.

The rubber jumping game represents a traditional play activity characterized by the use of elastic rubber bands strung together to form a long rope (approximately 3–4 meters), which children jump over at progressively increasing heights (Anggraini, 2025; Rahmawati & Destarisa, 2016). This game inherently involves gross motor movements including jumping, running, balance maintenance, and body coordination, while the preparatory activity of linking rubber bands together engages fine motor skills through precise finger manipulation and hand-eye coordination. The progressive difficulty structure of the game aligns with Vygotsky's scaffolding concept and Bruner's spiral curriculum theory, whereby learning advances from simple to complex tasks (Mu'mala & Nadlifah, 2019; Sabzi, 2025).

The rationale for this research emerged from preliminary observations at RA Asiah Pekanbaru, which revealed that motor development activities were limited primarily to walking exercises and occasional gymnastics. Children demonstrated reluctance in participating in physical activities, exhibited inadequate jumping and balancing abilities, and showed limited fine motor coordination. The absence of varied play-based motor development programs necessitated the introduction of an alternative pedagogical intervention.

Accordingly, the objectives of this study were: (1) to evaluate the effectiveness of the rubber jumping game in enhancing fine motor skills among Group B children at RA Asiah Pekanbaru; (2) to assess the impact of the rubber jumping game on gross motor skill development; and (3) to determine the magnitude of motor skill improvement across two intervention cycles using the classroom action research framework.

MATERIALS AND METHODS

Study Participants

The study cohort comprised 10 children enrolled in Group B (aged 5–6 years) at Raudhatul Athfal (RA) Asiah, located at Jalan T. Bey Komplek Peputra Jaya Blok II No. 85, Simpang Tiga, Bukit Raya District, Pekanbaru City, Riau Province, Indonesia. The demographic composition included 6 males (60%) and 4 females (40%). Participants were selected through purposive sampling based on their enrollment in Group B and parental informed consent for study participation. The Group B teacher served as both the collaborating practitioner and informant, with the school principal providing institutional oversight.

Study Organization and Research Design

This study employed a Classroom Action Research (CAR) design, which represents a systematic inquiry conducted by teachers within their educational context to improve pedagogical practices and student learning outcomes (Kemmis et al., 2013). The CAR framework was selected for its participatory nature and its capacity to generate contextually relevant solutions to identified educational challenges.

The research was conducted from April to June 2020, organized across three distinct phases: (a) Pre-cycle assessment (baseline), (b) Cycle I intervention and assessment, and (c) Cycle II intervention and assessment. Each cycle followed the four-stage iterative model: Planning, Action, Observation, and Reflection.

Cycle I Protocol: During the planning stage, the researcher collaborated with the classroom teacher to develop the Daily Learning Implementation Plan (RPPH) incorporating the rubber jumping game. The action stage commenced with opening prayers, followed by instructor demonstration of the game mechanics, guided student participation according to the established scenario, peer observation, and a concluding assessment. The observation stage involved systematic documentation of children's motor performance using structured observation instruments. The reflection stage entailed collaborative analysis of outcomes to identify strengths and areas for improvement.

Cycle II Protocol: Based on Cycle I reflections, modifications were implemented including enhanced stimulus provision, revised game strategies with clearer rules enforcement, and the introduction of reward-based motivation (snack incentives for achieving indicator-aligned performance). Cycle II sessions were conducted on June 15 and 17, 2020, with the thematic framework of "Vehicles—Air Transportation."

Assessment Instruments

Motor skill assessment utilized two structured observation instruments developed based on developmental indicators from Rahyubi (2012) and aligned with the National Standards for Early Childhood Education (Organisasi, 2014):

Gross Motor Observation Sheet assessed seven indicators: (1) body movement balance during jumping, (2) body movement agility during jumping, (3) body movement speed during jumping, (4) standing without assistance, (5) one-legged jumping without apparatus, (6) physical game participation with rules, and (7) running while jumping.

Fine Motor Observation Sheet assessed nine indicators including: self-care abilities (bathing, eating, hand washing, hair combing, shoe tying), molding with clay/plasticine/sand, line drawing (horizontal, circular, curved, diagonal), paper folding (1–6 folds), sewing variations (cross-stitch, running stitch) through 15 holes, cutting with various media following patterns, form pricking, making neat circles and squares, and pencil grip (between two fingers and thumb).

Both instruments employed a four-point developmental rating scale: BB (Belum Berkembang/Not Yet Developed = 1), MB (Mulai Berkembang/Beginning to Develop = 2), BSH (Berkembang Sesuai Harapan/Developing as Expected = 3), and BSB (Berkembang Sangat Baik/Developing Very Well = 4).

Statistical Analysis

Data analysis employed descriptive quantitative and qualitative approaches. Individual achievement percentages were calculated using the formula: $Pi = (F/N) \times 100\%$, where Pi represents the observation result, F denotes the score obtained by the child, and N indicates the total maximum score (Yoni, 2010). Mean scores were computed using: $\overline{X} = \Sigma x / \Sigma n$, where $\overline{X}$ is the mean value, Σx is the sum of all children's scores, and Σn is the number of children (Sudjiono, 2012).

Developmental categorization followed four achievement levels: 80%–100% (Developing Very Well/BSB), 60%–79% (Developing as Expected/BSH), 30%–59% (Beginning to Develop/MB), and 0%–29% (Not Yet Developed/BB). Classical learning completeness was established at a minimum threshold of 59%, with the success criterion categorization adapted from Aqib (in Yani, 2017): >80% (Very High), 60%–79% (High), 40%–59% (Moderate), 20%–39% (Low), and <20% (Very Low). Interactive data analysis encompassed three components: data reduction, data display, and conclusion drawing (Madya, 2006).

Ethical Considerations

This study was conducted in accordance with ethical principles governing educational research involving minors. Institutional authorization was obtained from the leadership of RA Asiah Pekanbaru and the Faculty of Islamic Studies, Universitas Islam Riau. Written informed parental consent was secured for all participating children prior to study commencement. All research activities were conducted within the regular school schedule to minimize disruption to the children's routine. Participant anonymity was maintained through the use of coded identifiers (e.g., KKM, AKI, FIM) throughout data collection and analysis. The study design ensured that all children received the intervention as part of their regular educational program, with no exclusion or differential treatment.

RESULTS

Pre-Cycle Assessment (Baseline)

Initial assessment prior to intervention implementation revealed critically low motor development levels among the study participants. For fine motor skills, the cohort mean score was 6.00 (out of a maximum of 24), with individual scores ranging from 4 to 8. Seven children (70%) were categorized as "Not Yet Developed" (BB), while three children (30%) demonstrated "Beginning to Develop" (MB) status. No children achieved "Developing as Expected" (BSH) or "Developing Very Well" (BSB) categories.

For gross motor skills, the baseline mean score was 6.10 (out of a maximum of 28), with individual scores ranging from 5 to 8. Similarly, seven children (70%) were classified as "Not Yet Developed" (BB), and three children (30%) as "Beginning to Develop" (MB). Qualitative observations indicated that children exhibited difficulty maintaining balance during jumping, expressed fear of falling, showed limited understanding of game rules, and demonstrated poor body coordination.

Table 1. Summary of Pre-Cycle Motor Skills Assessment (N = 10)

Category	Score Range	Fine Motor (n)	Fine Motor (%)	Gross Motor (n)	Gross Motor (%)
BSB	19–24	0	0%	0	0%
BSH	13–18	0	0%	0	0%
MB	7–12	3	30%	3	30%
BB	1–6	7	70%	7	70%
Mean Score		6.00		6.10	

Note. BSB = Developing Very Well; BSH = Developing as Expected; MB = Beginning to Develop; BB = Not Yet Developed.

Cycle I Results

Following the first intervention cycle, motor skill improvements were observed across both domains. Fine motor mean scores increased from 6.00 to 12.00, representing a 100% improvement from baseline. Four children (40%) progressed to "Developing as Expected" (BSH), while six children (60%) achieved "Beginning to Develop" (MB) status. No children remained in the "Not Yet Developed" category for fine motor skills.

Gross motor mean scores increased from 6.10 to 9.00, representing a 47.5% improvement. Nine children (90%) achieved "Beginning to Develop" (MB) status, while one child (10%) remained at the "Not Yet Developed" (BB) level. Reflective analysis following Cycle I revealed that while improvement was evident, the majority of children had not yet reached optimal development levels, necessitating modifications for Cycle II.

Cycle II Results

The modified intervention in Cycle II yielded substantial improvements. Fine motor mean scores increased to 20.60, with seven children (70%) achieving "Developing Very Well" (BSB) status and three children (30%) reaching "Developing as Expected" (BSH). Individual scores ranged from 14 to 26, demonstrating marked improvement in rubber band linking, pencil grip, self-care activities, and various manipulative skills.

Gross motor mean scores reached 18.40, with seven children (70%) attaining "Developing Very Well" (BSB), two children (20%) achieving "Developing as Expected" (BSH), and one child (10%) at "Beginning to Develop" (MB). Children demonstrated enhanced jumping balance, body agility, speed, one-legged jumping proficiency, rule adherence, and running-while-jumping abilities.

Table 2. Comparative Motor Skills Development Across Intervention Phases (N = 10)

Category	Pre-Cycle Fine (%)	Pre-Cycle Gross (%)	Cycle I Fine (%)	Cycle I Gross (%)	Cycle II Fine (%)	Cycle II Gross (%)	Achievement (%)
BSB	0	0	0	0	70	70	80–100
BSH	0	0	40	0	30	20	60–79
MB	30	30	60	90	0	10	30–59

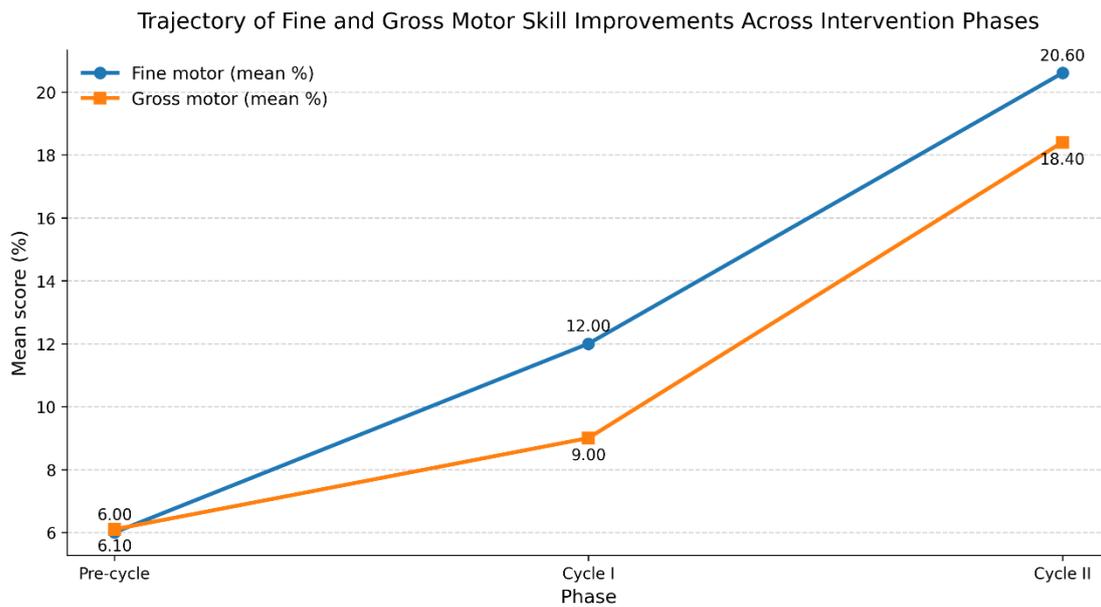|							
BB	70	70	0	10	0	0	0–29
Mean	6.00	6.10	12.00	9.00	20.60	18.40	

Figure 1. Trajectory of Fine and Gross Motor Skill Improvements Across Pre-cycle, Cycle I, and Cycle II.

Figure 1 shows a clear upward trend in both fine and gross motor outcomes across the intervention phases. Fine motor performance increased from 6.00% (pre-cycle) to 12.00% (Cycle I) and reached 20.60% in Cycle II, while gross motor performance rose from 6.10% (pre-cycle) to 9.00% (Cycle I) and increased further to 18.40% in Cycle II. Overall, the largest gains were observed by Cycle II, indicating that continued implementation of the rubber jumping game was associated with progressive improvements in children's motor skill development.

Classical Learning Completeness

The classical learning completeness analysis demonstrated that by the conclusion of Cycle II, 80% of participants achieved the established success criterion. According to the success criteria classification framework (Yani, 2017), this level of achievement is categorized as "Very High," confirming that the rubber jumping game intervention successfully met and exceeded the minimum completeness threshold of 59%.

Table 3. Classical Learning Success Criteria and Achievement

Success Level (%)	Category	Study Achievement
>80%	Very High	(80%)
60–79%	High	
40–59%	Moderate	
20–39%	Low	
<20%	Very Low	

DISCUSSION

The present study provides empirical evidence supporting the effectiveness of the rubber jumping game as a pedagogical intervention for enhancing both fine and gross motor skills in early childhood education. The progressive improvement observed from pre-cycle through Cycle II demonstrates that structured, play-based traditional games can serve as effective vehicles for motor development when systematically integrated into the curriculum.

The significant improvement in gross motor skills aligns with the findings of Rahmadani et al. (2018), who demonstrated that traditional games positively influence the development of basic motor skills in kindergarten children. The present results further corroborate the meta-analytic findings of (Bin et al., 2023; Wang & Zhou, 2024), who established that motor development-focused exercise training produces superior outcomes compared to unstructured physical activity in preschool populations. The rubber jumping game, with its inherent requirements for jumping, running, balancing, and body coordination, provides a comprehensive gross motor training stimulus that engages multiple fundamental movement patterns simultaneously (Soto et al., 2021; Tarigan et al., 2025; Wang & Zhou, 2024).

The concurrent improvement in fine motor skills represents a particularly noteworthy finding. The rubber band linking activity, which constitutes the preparatory phase of the game, requires precise finger manipulation, bilateral hand coordination, and sustained attention—all of which are core components of fine motor competency (Khairani et al., 2025; Pura & Asnawati, 2019). This dual-domain impact is consistent with the theoretical framework proposed by Bondi et al. (2021), who demonstrated significant crosstalk between gross and fine motor domains during childhood development, suggesting that improvements in one domain may facilitate development in the other.

The progressive improvement pattern across cycles—from critically low baseline scores (mean fine motor: 6.00; gross motor: 6.10) to substantially elevated Cycle II scores (mean fine motor: 20.60; gross motor: 18.40)—reflects the iterative refinement

process inherent in the classroom action research methodology. The modifications implemented between Cycle I and Cycle II, including enhanced teacher scaffolding, clearer rule articulation, and reward-based motivation, proved instrumental in optimizing learning outcomes. This finding supports the pedagogical principle that structured play with appropriate adult guidance yields superior developmental outcomes compared to unstructured activities (Sutapa et al., 2021; Wang & Zhou, 2024).

The cultural significance of the rubber jumping game adds an important dimension to its pedagogical value. As a traditional Indonesian game that has been progressively displaced by digital entertainment, its integration into early childhood curricula serves the dual purpose of motor development and cultural preservation (Andriati et al., 2025; Christ et al., 2026; Hasanah, 2016). This aligns with the broader international recognition that traditional games represent culturally responsive pedagogical tools that foster not only physical development but also social competencies including cooperation, sportsmanship, patience, and rule compliance (Escolano-Pérez et al., 2020; Tan et al., 2020).

The achievement of 80% classical learning completeness, classified as "Very High" according to established criteria, demonstrates that the rubber jumping game represents a viable and effective intervention for addressing motor development deficits in early childhood settings. The transition of 70% of children to the "Developing Very Well" (BSB) category by Cycle II indicates that sustained, structured intervention can produce meaningful developmental outcomes within a relatively brief timeframe.

Limitations. Several limitations warrant acknowledgment. The small sample size (N = 10) limits the generalizability of findings to broader populations. The absence of a control group precludes causal attribution of improvements solely to the intervention, as maturation effects and Hawthorne effects cannot be entirely excluded. The observation-based assessment approach, while ecologically valid, is susceptible to observer bias. Additionally, the two-cycle design provides limited longitudinal data on the sustainability of motor skill improvements. Future research should employ larger sample sizes, randomized controlled designs, standardized motor assessment tools (e.g., MABC-2), and longer follow-up periods to establish the robustness and durability of the intervention effects.

CONCLUSION

This classroom action research demonstrates that the rubber jumping game (permainan lompat karet) constitutes an effective pedagogical intervention for enhancing both fine and gross motor skills among early childhood learners. The intervention produced substantial improvements across two cycles, with fine motor mean scores increasing from 6.00 (baseline) to 12.00 (Cycle I) to 20.60 (Cycle II), and gross motor mean scores progressing from 6.10 to 9.00 to 18.40, respectively. By the conclusion of Cycle II, 70% of participants achieved "Developing Very Well" (BSB) classification in both motor domains, with classical learning completeness reaching 80%—categorized as "Very High."

These findings reinforce the theoretical proposition that traditional games represent culturally relevant, cost-effective, and developmentally appropriate tools for motor skill enhancement in early childhood education settings. The dual impact on both fine and gross motor domains highlights the comprehensive developmental potential of the rubber jumping game, which engages multiple physical, cognitive, and social competencies simultaneously.

Practical implications of this study suggest that early childhood educators should consider systematically integrating traditional games, particularly the rubber jumping game, into their pedagogical repertoire as a means of addressing motor development challenges. The iterative improvement achieved through the action research cycles underscores the importance of reflective practice, teacher scaffolding, and motivation strategies in optimizing intervention outcomes. Future investigations are recommended to explore the long-term sustainability of motor skill gains, the comparative effectiveness of various traditional games, and the scalability of this approach across diverse early childhood educational contexts. Additionally, researchers are encouraged to examine alternative traditional materials, such as natural fiber ropes from banana leaf stems, as sustainable game equipment options.

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CONFLICT OF INTERESTS

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