JECCE
(Journal of Early Childhood Care and Education)
Volume 9, No. 1, March 2026, pp. 1-16
DOI: 10.26555/jecce.v9i1.14930

ISSN (e): 2615-1413 || Journal Homepage: https://journal2.uad.ac.id/indeks.php/jecce

Effectiveness of song-and-movement creative arts on children's motor skills during the transition to Primary School

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Submitted: November 10, 2025 |Accepted: February 25, 2026 |Published: March 23, 2026

Abstract

Purpose – Gross motor readiness is an important but often undervalued aspect of children's transition from early childhood education to primary school. Although song-and-movement activities are widely used in Indonesian PAUD settings, their effects on children's gross motor readiness are still rarely tested through structured intervention and standardized indicators. This study therefore examined the effectiveness of a structured song-and-movement intervention on gross motor development among preschool children during the transition to primary school.
Design/methods/approach – A pre-experimental one-group pre-test and post-test design was used with 16 children aged 5–6 years in a PAUD institution in Karanganyar, Indonesia. The intervention was conducted over 8 weeks in 16 sessions using the "Aramsamsam" song-and-movement activity. Gross motor skills were assessed through five indicators: balance, strength, agility, coordination, and flexibility. Data were analysed using Shapiro-Wilk and paired-samples t-test.
Findings – Children's mean gross motor score increased from 8.81 (SD = 2.316) at pretest to 14.75 (SD = 3.088) at post-test. The difference was statistically significant ($t = -20.102$, $df = 15$, $p < .001$), with a very large effect size (Cohen's $d = 5.026$; Hedges' $g = 4.899$). The largest gains were found in coordination (1.43) and balance (1.37).
Research implications/limitations – The findings suggest that structured rhythm-based movement activities may enhance motor readiness during school transition. However, the absence of a control group limits causal interpretation. Further randomized studies are recommended.
Practical implications – Structured rhythm-based movement activities can be incorporated into early childhood classrooms as a playful strategy to support children's motor readiness for school transition.
Originality/value – This study contributes empirical evidence from Indonesia on the role of rhythm-structured song-and-movement activities in enhancing specific gross motor domains during the transition to primary school.

Keywords: gross motor skills, song and movement creative arts, transition

Paper type – Research paper

Published by: Universitas Ahmad Dahlan

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Introduction

The transition from early childhood education to primary school is a period of alignment that requires adjustments in the learning environment, learning methods, and social interactions (García-González, 2019). This change requires a specific strategy to ensure that children experience a comfortable, safe transfer while still exercising their rights optimally. One important aspect to consider during this transition period is the development of foundational competencies, including social-emotional maturity, early literacy and numeracy skills, and gross-motor development. These foundational competencies need to be fostered progressively and continuously from early childhood education through the early years of primary schooling to ensure a smooth adaptation to more structured academic demands (Khalawati et al., 2023).

However, field practices still reveal misconceptions regarding the admission of new learners (PPDB) in primary schools and learning approaches that do not fully reflect an understanding of the importance of the transition phase (Mardiani et al., 2024). Not all children have had the opportunity to undergo the foundation phase optimally, so many enter grade one of primary school without adequate preparation, often experiencing difficulties adjusting to more structured academic environments (Yuliantina et al., 2023). Suboptimal readiness may create barriers across multiple developmental domains, including social-emotional, cognitive, and physical development. Among these domains, gross motor readiness plays a foundational role in facilitating children's adaptation to classroom routines that require posture control, sustained attention, writing, and coordinated movement.

Despite its importance, physical-motor development is frequently undervalued in early childhood education, where academic readiness is narrowly defined by cognitive indicators. Such a perspective overlooks the fundamental role of motor competence in supporting children's overall readiness to learn. Motor competence plays an essential role in enabling children to participate effectively in structured classroom activities, sustain attention, and engage in early academic tasks. Empirical evidence further indicates that motor skills are positively associated with early academic achievement, particularly during the transition to formal schooling (Cameron et al., 2013). Motor development is not merely physical activity; it involves neuromuscular coordination, balance regulation, spatial awareness, and movement timing, all of which contribute to functional classroom engagement.

Although song-and-movement activities are commonly implemented in Indonesian early childhood settings, empirical evidence quantifying their measurable impact on gross motor readiness during the transition to primary school remains limited. Most existing studies describe implementation practices descriptively rather than experimentally, leaving a methodological gap regarding the effectiveness of structured rhythm-based interventions assessed through standardized motor indicators. The use of standardized motor-assessment indicators remains limited. Existing literature often describes such activities descriptively rather than experimentally, leaving a gap in evidence regarding their measurable effectiveness during the critical transition phase.

From a motor learning perspective, rhythm-based movement may facilitate coordination through mechanisms of rhythmic entrainment and neuromotor synchronization. Auditory rhythmic cues provide external temporal structure, allowing children to align limb movements with consistent beats, thereby enhancing timing accuracy and inter-limb coordination. Repetitive patterned movements strengthen motor pathways through practice-dependent automatization, improving stability, balance control, and movement efficiency. Musical cues function as regulatory stimuli that support motor sequencing and spatial-temporal organization.

The “Aramsamsam” activity was selected for this study due to its structured rhythmic pattern, progressive movement complexity, and cultural familiarity within early childhood settings. The song integrates coordinated upper- and lower-limb movements, directional shifts, tempo-based sequencing, and repetitive motion cycles, making it suitable for simultaneously stimulating balance, agility, strength, coordination, and flexibility. Its predictable rhythmic structure allows children to internalize timing cues as they gradually refine motor precision.

In line with this (Yuliani & Hanif, 2024) asserted that many children experience challenges in their motor development due to a lack of appropriate stimulation, limited physical activity during learning, and the dominance of conventional methods that are less interactive and engaging for early childhood. This hampers children's readiness to face academic demands in primary school. Therefore, learning methods are needed that not only optimally stimulate physical-motor development but also create fun and engaging learning experiences for children. Thus, children can better navigate the transition to primary school, possess adequate physical readiness, and participate more actively and effectively in the learning process.

During physical-motor development, children progress through stages as they age. These stages form the basis for more complex motor development later on. When a child's basic motor skills are mature, other, more complex motor skills will be easier to master (Wulandari & Lestari, 2023). Therefore, school readiness does not focus solely on cognitive aspects; it must also be oriented towards ensuring that children's rights to a transition process are fulfilled in accordance with their developmental stages. This readiness encompasses optimal physical and motor abilities, enabling children to adapt to a more structured learning environment in primary school.

To support children’s readiness for primary school, learning in early childhood settings should be grounded in developmentally appropriate and play-based principles. Playful and active learning approaches enable children to construct understanding through exploration, movement, and social interaction elements essential to the development of self-regulation and adaptive classroom participation. Within this perspective, guided play becomes particularly meaningful because teachers intentionally structure learning environments and interactions to orient children toward specific developmental goals while maintaining children’s agency and engagement (Hollenstein & Vogt, 2024; Nesbitt et al., 2023). Such pedagogical balance is especially important during the transition to primary school, when children are expected to sustain attention, coordinate motor actions, and engage in more structured learning contexts.

Song-and-movement activities represent a structured form of guided play that integrates rhythmic cues with coordinated physical actions. Such activities simultaneously stimulate balance, strength, coordination, and agility while sustaining children’s intrinsic motivation to participate. Empirical evidence suggests that movement-and-song activities effectively support children’s physical-motor development by enhancing gross motor coordination and rhythmic movement patterns in early childhood learning contexts (Mahiroh & Adawiyah, 2025). These characteristics make song-and-movement methods particularly relevant for fostering motor readiness during the transition to formal schooling. Additionally, these activities enhance children's balance, muscle strength, and agility. For example, playing the song ‘Head, shoulders, knees, feet’ teaches children to recognise body parts while practising coordination of movements. Similarly, simple dances or rhythmic games encourage children to move in sync with the music's rhythm, improving their motor skills in a fun and engaging way.

The primary principle of early childhood movement development lies in the gradual coordination of physical motor abilities, encompassing both gross and fine motor skills. In early stages, children's movements tend to be fragmented and less controlled; however, as they gain experience and interact with their physical and social environments, motor actions become increasingly organized and adaptive. Motor development is not merely a product of maturation but is strongly shaped by active exploration and repeated movement experiences.(Franchak & Adolph, 2024) One activity in developing physical motor learning games involves incorporating motion and song. At ages 5-6 years, or during the transition from PAUD to SD, children's gross motor skills include strength, balance, coordination, flexibility, and agility (Magfiroh et al., 2019)

The implementation of song-and-movement-based learning in early childhood education not only supports physical and motor development but also enhances social-emotional development. Children learn to cooperate, follow instructions, and express themselves more confidently through movement and music. As such, it is an effective transition strategy for preparing children for the more structured, academic environment of primary school. Therefore, it is essential for educators and parents to recognize children's readiness to transition to the next stage of development. By implementing play-based-learning through song and movements, children can undergo the transition process in a more optimal, fun, and developmentally appropriate manner.

Methods

This study employed a pre-experimental one-group pretest–posttest design to examine the effect of a song-and-movement creative arts intervention on gross motor skills in children aged 5–6 years. Although no control group was included, this design allowed the measurement of developmental changes following structured intervention within a natural classroom setting.

Participants consisted of 16 children enrolled in the final year of one of the kindergarten centers in Karanganyar, Indonesia. The selection of research subjects was conducted using nonprobability sampling (saturated sampling). Inclusion criteria included: (1) age 5–6 years, (2) regular attendance, and (3) no physical disorders affecting motor performance.

The intervention lasted 8 weeks (16 sessions), twice per week, with each session lasting approximately 30 minutes. Each session consisted of warm-up activities, core rhythmic movement using the song "Aramsamsam", and cool-down activities. Movement complexity was gradually increased across sessions, beginning with simple bilateral movements and progressing to coordinated locomotor and non-locomotor combinations involving tempo variation and directional changes. The movements were progressively structured to stimulate balance, strength, agility, coordination, and flexibility, following principles of motor development and motor learning (Gallahue, D. L., Ozmun, J. C., & Goodway, 2012).

Gross motor skills were assessed using an observational performance rubric covering five domains: balance, strength, agility, coordination, and flexibility. Each domain was scored on a 5-point scale (1 = unable to perform; 5 = independent and consistent performance), yielding a total possible score range of 5–25. The rubric included behaviorally anchored descriptors to ensure objective scoring. The same trained assessor administered both pretest and posttest to ensure scoring consistency.

Data were analyzed using SPSS. Normality was assessed using the Shapiro–Wilk test. Differences between pretest and posttest scores were examined using a paired-samples t-test with a significance level of $p < 0.05$. Approval was obtained from the head of the early childhood center before implementation. Written informed consent was obtained from parents before data collection, and participant confidentiality was maintained throughout the study. Pretest and posttest were conducted under identical classroom conditions. Standardized instructions and demonstrations were provided before the performance assessment to ensure understanding of the task.

As a single-group pretest–posttest design, this study is potentially subject to threats to internal validity such as maturation effects and testing effects. However, the relatively short intervention period (eight weeks) and structured implementation are intended to minimize uncontrolled external influences. To minimize testing bias, the same assessment rubric and standardized instructions were used during both pretest and posttest sessions. The assessor was trained prior to data collection to ensure scoring consistency and reduce subjectivity.

This study was conducted in accordance with ethical standards for research involving young children. Prior to implementation, formal permission was obtained from the head of the early childhood center. Written informed consent was obtained from parents or legal guardians after they were informed of the study's purpose, research procedures, voluntary participation, and data confidentiality. Participation was entirely voluntary, and children were allowed to withdraw at any time without consequences. The intervention posed no physical or psychological risk, as activities consisted of age-appropriate creative movement aligned with the early childhood curriculum. All data were anonymized and used solely for research purposes to ensure confidentiality and privacy. The study respected children’s dignity and well-being throughout the research process.

Result

Figure 1 shows the activities used to assess children's gross motor skills; these activities are also carried out after treatment, namely the song-and-movement ‘Aramsamsam’. Each child performs three activities. The first activity involves jumping over three hula-hoops with one foot, then with two feet to assess their balances and body strength. The second and third activities
were combined into one, namely carrying a ball while walking in a straight line, which serves to hone coordination as well as agility and flexibility of movement when changing positions.

Figure 1.
Introduction of physical motor activities during pretest and posttest

Figure 2.
Giving examples for Aramsamsam Song and Movement

Figure 2 illustrates the stages of giving instructions to a group of children for carrying out song-and-movement activities under the researcher's guidance. In the early stages of implementation, children experienced problems in maintaining balance. and coordinating their body movements with the song's rhythm. This difficulty arose because children were not yet accustomed to the aramsamsam song and movement pattern, so it took time to adapt. The children's obstacles experiences are mainly related to balance and coordination between movements and the song's rhythm. Children tend to have difficulty harmonizing hand, foot, and body movements with the tempo of the music. Another factor contributing to this difficulty is the lack of prior experience in activities that combine music and movement. Therefore, repeated practice and more intensive guidance are needed so that children can adjust and perform movements more stably and coordinately.

Figure 3.
Children practicing Song and Movement Aramsamsam in groups

Figure 3 illustrates the stage at which the children began practicing the Aramsamsam Song and Movement in groups, receiving guidance and instructions from the researcher. At this stage, each group began to adjust to the Aramsamsam movements and attempted to follow the previously taught pattern. Although some groups have shown progress in imitating the movements more effectively, others still struggle to practice them optimally. This difficulty was generally due to a lack of prior experience with listening to or practicing Aramsamsam Song and Movement. As a result, children experienced obstacles in maintaining balance and in harmonizing hand, foot, and body movements with the tempo of the music. Coordinating movements that require concentration and good motor skills is a challenge in itself. However, despite the obstacles, the children's enthusiasm to complete the Aramsamsam song remained high. They kept trying to adjust their movements to the music's rhythm and worked together in groups to complete the activity. This shows that with repeated practice and consistent guidance, children can become more skillful in performing Song and Movement Aramsamsam in a more coordinated and harmonious manner.

Based on the explanation above, it can be seen that since the children first practiced and applied the song-and-movement method “Aramsamsam”, their physical motor skills have significantly improved. This is reflected in the process of implementing the activities, where, in the early stages (pretest), children still faced difficulties maintaining balance and coordinating hand, foot, and body movements in time with the music's tempo. Movement coordination that requires concentration and good motor skills is a challenge for them.

Observation at the pretest stage was conducted to obtain an initial picture of children's motor development, particularly in terms of movement coordination. Before being introduced to the song-and-movement method “Aramsamsam”, children are taught movements that match the song's rhythm and learn the activity's rules. This step aims to make them better understand the concept of structured movements while gradually improving their motor skills.

Table 1.
Statistical Test Results on the Effect of Song and Movement-Based Creative Arts on Children's Motor Skills During the Transition from PAUD to Elementary School

Group	N	Min	Max	Range	Average	Std. Dev
Prettest	16	5	13	8	8.81	2.316
Posttest	16	8	20	12	14.75	3.088

Table 1 presents the pretest data from the experimental group that were analyzed using the average score per child, and the results were analyzed using SPSS 26 for Windows to ensure accuracy. Measurement of children's physical motor skills was conducted using five indicators adapted from Magfiroh et al. (2019) and Wulandari & Lestari (2023) and adjusted to the level of child development, in accordance with Permendikbud No. 137 of 2014. The analysis results show that the data obtained are valid and can be used to evaluate the effectiveness of the treatment administered. The average pre-test score (M = 8.81) was categorized as “Not Yet Developing (BB)” according to national early childhood development standards. Following the intervention, the average post-test score increased to 14.75, resulting in an overall classification in the “Beginning to Develop (MB)” category.

Although the participants, on average, had not yet reached the "Developing as Expected (BSH)" level, the categorical progression from BB to MB reflects meaningful developmental advancement over the intervention period. A paired-sample t-test confirmed that the improvement was significant ($p < .001$). Furthermore, the calculated effect size (Cohen's $d = 5.026$) indicates a large practical impact of the intervention on children's gross motor performance.

Indicator-level analysis revealed that coordination and balance demonstrated the greatest gains, suggesting that structured rhythm-based movement activities may particularly enhance motor synchronization and postural stability. However, given the relatively short duration of the intervention, sustained implementation may be required to achieve higher developmental mastery levels.

Table 2.
Shapiro Wilk Test Results

Experiment	Sig	P.0,05	Description
Pretest	*0.412*		*Normal*
Posttest	*0.066*		*Normal*

The normality test results show that: (1) the significance value of the pretest data in the experimental group was 0.412, and (2) the significance value of the posttest data in the experimental group was 0.066. Based on the analysis of pretest and posttest data collected from 16 children aged 5-6 years, using five indicators to measure physical motor skills, the results indicate that the data are normally distributed. This is because the significance value is greater than 0.05 ($\rho > 0.05$), indicating that the data meet the normality requirements.

In this study, the analysis method employed was a paired sample t-test, a statistical test that compares two paired samples. This test is applied to the same sample under two different conditions or treatments, aiming to assess the effectiveness of the intervention. The success of the intervention can be seen in the average difference between the conditions before and after treatment. The results of the paired sample t-test in the experimental group are presented as follows.

Table 3.
Paired Sample T-Test Hypothesis Test

Test	Average	Sig (p)
Pretest	8.81	0,000
Posttest	14.75	

Table 3 shows the data analysis using the Paired Samples t-test that revealed a significant difference in the average pre- and post-test scores (8.81 and 14.75), with a p-value of $< .001$. Therefore, the alternative hypothesis (H_a) is accepted, indicating that the Song and Movement method significantly improved children's physical motor skills.

In addition to statistical significance, the magnitude of the intervention effect was examined using an effect size analysis. Table 4 reports an inferential statistical analysis results from the paired-samples t-test.

Table 4.
Inferential statistical analysis results from the paired-samples t-test

Pretest Mean (SD)	Posttest Mean (SD)	Mean Difference	t	df	Sig. (2-tailed)	Cohen's d	Hedges' g
8.81 (2.316)	14.75 (3.088)	-5.937	-20.102	15	< .001	5.026	4.899

The results indicated an extremely large effect size (Cohen's d = 5.026; Hedges' g = 4.899), demonstrating the substantial practical impact of the Song and Movement-Based Creative Arts approach on children's physical motor development. This finding suggests that the observed improvement was meaningful in practical and educational contexts, as well as being statistically significant. The very large effect size may be influenced by the high pre–post correlation (r = .944), indicating consistent improvement across participants.

Table 5.
Data on the Results of Research on Gross Motor Physical Ability Pretest and Post-test

No	Name	Pretest Value	Posttest Value
1.	AL	10	16
2.	AM	13	19
3.	DN	7	13
4.	GM	13	20
5.	GL	11	16
6.	IP	8	15
7.	KN	8	13
8.	MC	10	16
9.	SF	7	13
10.	RB	5	8
11.	SHF	9	16
12.	GR	9	15
13.	AG	9	16
14.	SM	5	9
15.	LB	8	15
16	AF	9	16
Amount		141	236
Average		8,812	14,75

Based on Table 5, the pre-test results show that, before receiving intervention through the physical motor activities of the song-and-movement method “Aramsamsam”, children's scores ranged from 5 to 13, with an average of 8.81. This low achievement is reinforced by initial observations indicating that children still struggle to maintain balance, especially when walking in a straight line and jumping.

After receiving treatment through song and movement, “Aramsamsam”, there was a significant increase in the children's physical motor skills. The post-test results showed that the lowest score increased to 8, the highest to 20, and the average to 14.75. When comparing the pre-test and post-test results in the experimental group, the average score increased by 5.94 points, from 8.81 to 14.75.

These results indicate a consistent improvement in children's gross motor performance following the intervention. Improvements were observed across all measured indicators, with the most notable gains occurring in coordination and balance.

Table 6.

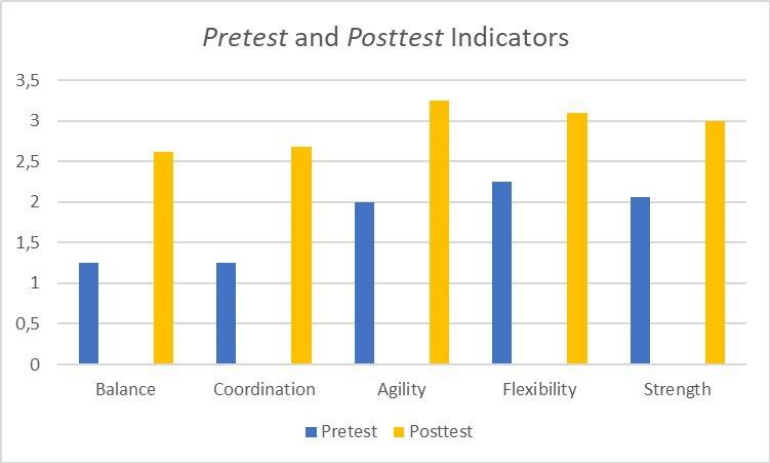
Data on the Results of Research on Gross Motor Physical Ability Pretest and Post-test

Indicator	Pretest Mean	Posttest Mean	Gain
Balance	1.25	2.62	1.37
Coordination	1.25	2.68	1.43
Agility	2.00	3.25	1.25
Flexibility	2.25	3.10	0.85
Strength	2.062	3.00	0.94

Table 6 displays a comparison of the mean pre-test and post-test scores for each gross motor skill indicator. The fifth indicator showed improvement after the intervention. Comparison at the indicator level revealed improvements across all five gross motor skill domains after the intervention. Coordination showed the highest improvement (1.43), followed by balance (1.37), and agility (1.25). Strength showed the smallest improvement (0.85), while strength showed the greatest improvement (0.94). Although the magnitude of improvement varied across domains, the results showed consistent positive changes across all measured gross motor skill components.

These findings indicate that the intervention contributed to consistent improvements across motor domains, with greater gains in components of movement control (coordination and balance) than in components of physical conditioning (strength and flexibility). Overall, the indicator level analysis supports the general trend observed in the total score comparison. To further interpret these findings, the implications of domain-specific improvements are discussed in relation to motor development theory.

Figure 4.
Comparison of Pretest and Posttest Research Data



After receiving the Song and Movement-Based Creative Arts intervention, children demonstrated significant improvements in gross motor performance during the transition from PAUD to SD. Rather than merely indicating effectiveness, these findings suggest that rhythmic-motor integration played a central role in facilitating motor gains. The structured combination of repetitive movements and synchronized musical rhythms likely enhanced neuromotor coordination through rhythmic entrainment, a process in which external auditory cues regulate the timing and precision of body movements. Such synchronization supports sensorimotor integration and strengthens motor planning abilities.

In this study, the Aramsamsam technique involved patterned clapping, alternating foot movements, and coordinated upper–lower-body actions performed in tempo with the music. These activities specifically trained balance through controlled weight shifting, coordination through bilateral limb movements, and agility through tempo-based directional changes. Repeated exposure to these structured motor patterns may have reinforced motor pathways consistent with motor learning theory, which emphasizes repetition, feedback, and timing as key components in skill acquisition.

A closer examination of each motor domain revealed differentiated patterns of improvement. The largest gain was observed in coordination (1.43), followed by balance (1.37), agility (1.25), strength (0.94), and flexibility (0.85). This distribution provides insight into the specific mechanisms underlying the observed improvements.

The substantial increase in coordination aligns with the bilateral and cross-lateral movement patterns embedded in the Aramsamsam technique, including alternating clapping sequences and synchronized upper–lower body actions. These activities required temporal accuracy and interlimb integration. According to principles outlined in Understanding Motor Development (Gallahue, D. L., Ozmun, J. C., & Goodway, 2012). Coordination develops optimally when children engage in structured, repetitive movement experiences that integrate timing and spatial control. The use of rhythmic auditory cues likely facilitated entrainment between auditory and motor systems, strengthening neuromotor pathways responsible for coordinated action.

Balance demonstrated the second-highest improvement. Controlled weight shifting, tempo-regulated stepping, and postural transitions embedded within the movement sequences likely stimulated dynamic stability mechanisms. As described in Dynamic Physical Education for Elementary School Children, movement tasks that challenge equilibrium by altering tempo, direction, and body position can strengthen balance-related control through repeated practice and varied movement demands (Beighle & Pangrazi, 2024). The progressive increase in movement complexity throughout the eight-week intervention may have strengthened anticipatory postural control and core stabilization. Agility gains were also meaningful and can be attributed to tempo-based directional changes and rapid motor adjustments required during rhythmic transitions. From a motor learning perspective, externally paced movements enhance reaction timing and adaptability, as children must continuously adjust speed and direction in response to auditory signals.

In contrast, strength and flexibility showed comparatively smaller gains. This pattern is theoretically consistent, as rhythmic-motor interventions primarily target coordination and timing rather than maximal muscular force or static range of motion. While repeated squatting, stepping, and arm-extension movements may have contributed to moderate strength development, the intervention did not involve resistance-based or targeted flexibility training. Thus, improvements in these domains likely occurred as secondary effects of dynamic movement repetition rather than as primary training outcomes.

These findings are consistent with prior studies demonstrating that movement-based learning enhances gross motor skills through active engagement and structured repetition. Importantly, all cited literature directly addresses motor development, reinforcing the theoretical alignment of the present findings with established developmental frameworks.

Discussion

The results of this study indicate that a song-and-movement-based creative arts intervention produces measurable improvements in several domains of children's gross motor skills during the transition from early childhood education to primary school. Among the asse- Sensory components, coordination, and balance showed the most substantial improvement, suggesting that rhythm-structured movement activities may play an important role in supporting children's motor control during early educational transitions. These findings indicate that structured movement activities embedded in musical rhythm can provide meaningful opportunities for children to practice fundamental motor skills through engaging and developmentally appropriate learning experiences.

Motor competence has long been associated with children's readiness for school and their ability to adapt to classroom routines, including maintaining postural control, regulating attention, and participating in structured learning activities (Cameron et al., 2013). The improvements in coordination and balance observed in this study, therefore, have implications beyond physical development alone. Within the context of early childhood education as a foundational stage that prepares children for the transition to primary school, strengthening motor competence may support children's ability to participate more effectively in structured classroom environments (Syafrida et al., 2020).

These findings are consistent with recent discussions emphasizing the importance of movement-integrated pedagogy in early childhood education. Rather than viewing physical activity as a supplementary component of learning, contemporary perspectives increasingly position movement as a meaningful medium through which children simultaneously develop physical, cognitive, and socio-emotional competencies (Capio et al., 2024) When fundamental movement skills are intentionally embedded within classroom learning and delivered through structured rhythmic sequences, movement-based activities can become an integral component of developmentally appropriate pedagogy.

Evidence from recent pilot programs in early childhood education centers also indicates that structured movement interventions can be effectively integrated into everyday classroom practice. Such programs have been found to be feasible for teachers and compatible with existing curricular routines, suggesting potential for wider application in early childhood learning environments (Pirie et al., 2025). In this study, the Aramsamsam technique provided structured rhythmic cues and patterned body movements, enabling children to repeatedly practice coordination, balance, and agility through playful engagement. These characteristics demonstrate how rhythm-structured movement activities can function as practical pedagogical tools during critical developmental transitions.

From a broader theoretical perspective, these findings can also be understood through the lens of embodied learning. Embodied learning frameworks suggest that children's learning processes are closely connected to bodily interaction with their environment, where perception, action, and cognition operate as integrated systems. Movement-based engagement, therefore, enriches the learning experience by allowing children to actively construct understanding through coordinated bodily activity (Faella et al., 2025). Within this perspective, song-and-movement activities can be interpreted not only as motor practice but also as embodied learning experiences that support children's participation and engagement in classroom contexts.

Beyond demonstrating the effectiveness of rhythm-structured movement activities, this study also contributes to the broader discussion on movement-integrated pedagogy in early childhood education. While movement-based interventions are commonly implemented in early childhood settings, they are often evaluated only in terms of general improvements in motor competence. The findings of this study provide a more differentiated perspective, showing that rhythm-structured activities may influence specific motor domains differently, with particularly great improvements in coordination and balance. The study also illustrates how rhythmic movement patterns can be systematically integrated into classroom learning through structured activity design, demonstrating that music-movement activities can function as intentional pedagogical strategies rather than merely recreational play.

Nevertheless, several limitations should be considered when interpreting these findings. Improvements in children's motor performance may partly reflect natural developmental processes, as children aged five to six experience rapid neuromuscular growth and refinement of postural control. Repeated exposure to the motor assessment task may also introduce practice effects, as children become increasingly familiar with the performance activities over time. These factors may have contributed to the observed improvements alongside the intervention itself.

The scope of the intervention also influenced the distribution of improvements across motor domains. The program primarily emphasized rhythmic coordination, balance, and dynamic movement patterns. Because the activities did not specifically target resistance-based strength training or flexibility exercises, improvements in these domains were comparatively modest. This pattern suggests that rhythm-based movement activities may be particularly effective at stimulating coordination and balance, while other aspects of motor development may require additional targeted training.

These limitations also open several directions for future research. Studies employing randomized or controlled experimental designs may provide stronger evidence regarding the causal effects of rhythm-based movement interventions on children's motor development. Longitudinal studies would also be valuable for examining whether improvements in coordination and balance persist over time and continue to support children's adaptation to structured classroom environments.

Future research may also explore how rhythm-based movement learning interacts with broader developmental processes. Investigating potential connections between rhythmic-motor activities, attention regulation, and classroom engagement may provide deeper insight into how movement-integrated pedagogy contributes to children's overall development during early educational transitions.

Conclusion

This study examined the role of the Song and Movement-Based Creative Arts method in enhancing children's gross motor skills during the transition from early childhood education (PAUD) to primary school (SD). The findings indicate that rhythm-structured movement activities can significantly improve children’s coordination and balance, suggesting that movement-based learning can play an important role in supporting children’s physical readiness for structured learning environments.

Beyond demonstrating improvements in motor performance, the study highlights the educational value of integrating music and coordinated movement within early childhood pedagogy. When movement activities are intentionally designed and implemented as part of classroom learning, they can function not only as recreational exercises but also as meaningful learning experiences that encourage active participation and embodied engagement.

From a practical perspective, the findings suggest that early childhood educators can incorporate structured song-and-movement activities into daily classroom routines to stimulate motor development while maintaining playful and engaging learning environments. Future studies may further explore the long-term impact of rhythm-based movement learning through longitudinal research designs and examine how movement-integrated pedagogy may influence broader developmental outcomes, including attention regulation, classroom engagement, and socio-emotional development. The conclusion should summarise the main state of play at the point of writing and consider the next steps

Declarations

Author contribution statement

All authors contributed significantly to the development of this study. The first author was responsible for conceptualizing the research, designing the intervention, coordinating the research process, conducting data collection and analysis, and preparing the initial draft of the manuscript. Several co-authors contributed to the development of the research framework, supported the implementation of the intervention in the learning setting, and assisted in data collection. Other authors contributed to data interpretation, literature review, and critical revisions of the manuscript to strengthen the academic argument. All authors participated in the discussion of the findings, provided feedback on the manuscript, and approved the final version for publication.

Funding statement

This research was supported by the Institute for Research and Community Service (LPPM), Universitas Sebelas Maret (UNS), under the Research Group Capacity Strengthening Scheme (PKGR-UNS C) [Contract Number 371/UN27.22/PT.01.03/2025]. The participating early childhood education institution in Karanganyar also supported this research by facilitating the study and assisting with data collection.

Data availability statement

The data supporting the findings of this study are not publicly available due to ethical considerations related to research involving young children. However, the data may be made available by the corresponding author upon reasonable request and with permission from the participating institution.

Declaration of interest's statement

The authors declare that they have no known competing financial interests or personal relationships that could have influenced the work reported in this paper.

Declaration of using AI (Artificial Intelligence)

Artificial Intelligence (AI) tools were used in a limited capacity to assist with language editing and improving the clarity of the manuscript. Specifically, the authors used ChatGPT (OpenAI) and Grammarly to support language refinement and minor text organization during manuscript preparation. These tools were used only for editing and language assistance purposes.

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