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The Effect of Circuit Games on Fine Motor Skills in Early Childhood at RA Perwanida 4 Palembang

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ABSTRACT

This study aimed to determine the effect of circuit games on the fine motor skills of early childhood students at RA Perwanida 4 Palembang, as some children were still found to experience difficulties with fine motor skills. The study employed a quantitative approach using a pre-experimental method and a One-Group Pretest-Posttest design. The subjects consisted of 23 children from Group B2 (aged 5–6 years) at RA Perwanida 4 Palembang. Data were collected through observation, tests, and documentation. The results showed an average pretest score of 20.39 and an average posttest score of 27.04. Thus, the implementation of circuit games demonstrated an improvement in the fine motor skills of the children in the group studied.

Introduction

Early childhood is widely recognized as a golden age, a critical period for growth and development across various domains, including fine motor skills. These skills are essential for everyday activities such

as writing, drawing, cutting, and threading beads, and they contribute to children's readiness for subsequent levels of education. Therefore, appropriate stimulation during early childhood is necessary to support optimal fine motor development (Reswari et al., 2022).

Fine motor skills can be developed through play-based activities appropriate to children's developmental characteristics. One such activity is circuit games, which provide active, enjoyable, and meaningful learning experiences while strengthening children's motor coordination. Circuit games consist of three sequential activity stations designed to improve hand–eye coordination, precision, and manipulative skills (Paramitha & Supiati, 2020). The first station involves using tongs to transfer pom-poms between containers, the second requires children to pull a cup with a ball placed on top, and the third involves threading beads onto a string.

Previous studies have demonstrated the potential benefits of circuit games for early childhood development. Paramitha and Supiati (2020) reported that circuit games effectively stimulated children's fine motor skills. Similarly, Azzahra et al. (2023) found that circuit-based activities enhanced children's engagement, making learning experiences more interactive and enjoyable. Furthermore, Wibisana et al. (2024) highlighted the contribution of active play to fine motor development, supporting the use of play-based learning strategies in early childhood education.

Despite these findings, previous research has frequently focused on gross motor development or the implementation of circuit-based learning activities rather than specifically examining fine motor skills. The present study addresses this focus by implementing a three-station circuit game involving activities designed to strengthen hand–eye coordination, finger control, and movement precision.

Preliminary observations at RA Perwanida 4 Palembang indicated that children in Group B2 continued to experience difficulties performing fine motor activities, suggesting the need for more engaging and developmentally appropriate learning strategies. Accordingly, this study aimed to examine the effect of circuit games on the fine motor skills of children at RA Perwanida 4 Palembang. The findings are expected to provide early childhood educators with an alternative play-based learning activity and contribute to existing discussions on fine motor development in early childhood education.

Methods

This study employed a quantitative approach using a pre-experimental method with a one-group pretest–posttest design to examine the effect of circuit games on children's fine motor skills. The study was conducted at RA Perwanida 4 Palembang during the second semester, from May 13 to June 3, 2026.

Table 1. One-Group Pretest–Posttest Research Design

Pretest	Treatment	Posttest

O_1	X	O_2

Note. O_1 = Pretest; X = Circuit game intervention; O_2 = Posttest.

The independent variable (X) was circuit games, defined as structured play activities involving several stations with specific challenges that children were required to complete. The dependent variable (Y) was fine motor skills, referring to physical abilities involving small muscle movements and hand–eye coordination.

The study population comprised 66 children enrolled in Group B at RA Perwanida 4 Palembang. The sample consisted of 23 children aged 5–6 years from Group B2, selected through purposive sampling based on preliminary observations indicating the need for further development of their fine motor skills (Sugiyono, 2022). The selection considered children's abilities in hand–eye coordination, precise tool manipulation, and finger movement coordination.

The study was conducted over 11 sessions, with each treatment session lasting approximately 10 minutes. The circuit game consisted of three activity stations: transferring pom-poms using tongs at the first station, pulling a cup with a ball placed on top at the second station, and threading beads onto a string at the third station. Children participated in the activities through a rotational sequence, moving from one station to another.

Data were collected through observation, tests, and documentation. Observation was used to monitor children's fine motor development,

while tests were administered during the pretest and posttest to assess changes in their abilities. Documentation provided supplementary evidence throughout the research process (Creswell & Creswell, 2018).

The research instrument consisted of an observation checklist developed around three indicators of fine motor skills among children aged 5–6 years: (1) coordinating hand and eye movements, (2) controlling hand and finger movements, and (3) performing movements accurately. Each indicator was assessed using a four-point developmental rating scale: Not Yet Developed (score 1), Beginning to Develop (score 2), Developing as Expected (score 3), and Very Well Developed (score 4).

The instrument comprised nine observation items and was examined for validity using the Pearson Product–Moment correlation test and reliability using Cronbach's alpha (Arikunto, 2021). Reliability was determined using a Cronbach's alpha threshold of 0.60, while item validity was assessed based on the correlation test results. These procedures were conducted to evaluate the suitability and consistency of the instrument for data collection.

Data were analyzed using the Shapiro–Wilk normality test to assess the distribution of the pretest and posttest scores. Subsequently, a paired-samples t-test was performed at a significance level of 0.05 to examine differences in children's fine motor skills before and after participating in the circuit games (Sugiyono, 2022).

Result and Discussions

The study was conducted at RA Perwanida 4 Palembang from May 13 to June 3, 2026, involving 23 children from Group B2. A one-group pretest–posttest design was employed to examine changes in children's fine motor skills following the implementation of circuit games. Data were analyzed using IBM SPSS Statistics version 27.

Instrument Validation

Before data collection, the research instrument underwent expert judgment by two lecturers from the Early Childhood Islamic Education Study Program, Aulia Rahmi, M.Pd., and Dini Anggraeni, M.Pd. Both validators assessed the relevance, clarity, and suitability of the observation indicators and assessment criteria. Their recommendations were incorporated into the instrument before its implementation.

Table 1. Expert Comments and Instrument Revisions

Validator	Comments	Revisions
Validator 1	Attention should be given to the observation indicators.	The observation items were aligned with the assessment rubric, and sentence consistency was improved.
Validator	The instrument was generally	The wording was

2	appropriate, but the wording required further attention, particularly the excessive use of conjunctions.	revised and refined to improve clarity.

Following expert validation, the instrument was examined for item validity and reliability to ensure its suitability for measuring children's fine motor skills.

Instrument Validity

The validity test was conducted using the Pearson Product–Moment correlation method through IBM SPSS Statistics version 27. The instrument comprised nine observation items representing three indicators: hand–eye coordination, hand and finger movement control, and movement precision. The calculated correlation coefficients were compared with the critical value of 0.413.

Table 2. Pretest Instrument Validity Results

Item	r-calculated	r-critical	Result
1	0.768	0.413	Valid
2	0.858	0.413	Valid
3	0.750	0.413	Valid
4	0.663	0.413	Valid

5	0.858	0.413	Valid
6	0.759	0.413	Valid
7	0.584	0.413	Valid
8	0.642	0.413	Valid
9	0.858	0.413	Valid

Source: IBM SPSS Statistics 27 output.

As presented in Table 2, all nine observation items demonstrated correlation coefficients exceeding the critical value of 0.413. Therefore, all items met the specified validity criterion and were retained for further analysis.

Table 3. Posttest Instrument Validity Results

Item	**r-calculated**	**r-critical**	**Result**
1	0.753	0.413	Valid
2	0.641	0.413	Valid
3	0.653	0.413	Valid
4	0.695	0.413	Valid
5	0.623	0.413	Valid
6	0.717	0.413	Valid

7	0.752	0.413	Valid
8	0.769	0.413	Valid
9	0.428	0.413	Valid

Source: IBM SPSS Statistics 27 output.

Table 3 indicates that all nine posttest observation items also exceeded the critical correlation value of 0.413. These findings suggest that the instrument items satisfied the established statistical validity criterion.

Instrument Reliability

Reliability testing was performed using Cronbach's alpha to evaluate the internal consistency of the nine observation items. A minimum coefficient of 0.60 was used as the reliability criterion.

Table 4. Pretest Reliability Results

Cronbach's alpha	Number of items
0.893	9

Source: IBM SPSS Statistics 27 output.

The pretest instrument obtained a Cronbach's alpha coefficient of 0.893, exceeding the minimum criterion of 0.60. This result indicates satisfactory internal consistency among the observation items.

Table 5. Posttest Reliability Results

Cronbach's alpha	Number of items
0.846	9

Source: IBM SPSS Statistics 27 output.

Similarly, the posttest instrument produced a Cronbach's alpha coefficient of 0.846, indicating that the observation items demonstrated satisfactory internal consistency. Therefore, both sets of measurements met the reliability criterion established in this study.

Implementation of Circuit Games

The intervention was conducted over 11 sessions, comprising two pretest sessions, seven treatment sessions, and two posttest sessions. During the first two sessions, children's initial fine motor skills were assessed through activities involving transferring large pom-poms using tongs, pulling a cup with a large ball placed on top, and threading large beads onto a string.

The treatment was implemented from the third to the ninth sessions using the same three-station circuit structure with medium-sized materials. Children rotated through each station, engaging in activities designed to stimulate hand–eye coordination, finger control, and movement precision.

The tenth and eleventh sessions involved posttest assessments using smaller pom-poms, balls, and beads. Observations indicated

improvements in children's ability to manipulate materials, coordinate hand and finger movements, and complete fine motor tasks.

Normality Test

Before hypothesis testing, the Shapiro–Wilk test was performed to determine whether the pretest and posttest scores were normally distributed. This test was selected because the study involved 23 participants.

Table 10. Results of the Normality Test

Measurement	Shapiro–Wilk statistic	df	Sig.
Pretest	0.952	23	0.317
Posttest	0.935	23	0.137

Source: IBM SPSS Statistics 27 output.

The Shapiro–Wilk test produced significance values of 0.317 for the pretest and 0.137 for the posttest. Since both values exceeded 0.05, neither distribution showed a statistically significant departure from normality. These findings supported the use of further parametric analysis, although the normality of the paired differences was not separately reported.

Hypothesis Testing

A paired-samples t-test was conducted to determine whether there was

a statistically significant difference between children's pretest and posttest fine motor scores following the circuit game intervention. The mean pretest score was 20.39, increasing to 27.04 in the posttest, representing an improvement of approximately 6.65 points.

Table 11. Paired-Samples t-Test Results

Statistical indicator	**Value**
Mean difference (Pretest − Posttest)	−6.65217
Standard deviation of differences	4.24916
Standard error	0.88601
95% CI lower bound	−8.48965
95% CI upper bound	−4.81470
t	−7.508
df	22
Sig. (2-tailed)	< 0.001

Source: IBM SPSS Statistics 27 output.

The paired-samples t-test revealed a statistically significant difference between pretest and posttest scores, $t(22) = -7.508$, $p < .001$. The negative mean difference reflects the subtraction of posttest scores from pretest scores. The results indicate that children's fine motor scores

increased significantly following the circuit game intervention.

Discussion

This study examined changes in fine motor skills among 23 children from Group B2 at RA Perwanida 4 Palembang following a circuit game intervention. The activities involved transferring pom-poms with tongs, pulling cups with balls placed on top, and threading beads onto strings. These tasks provided opportunities for children to practice hand–eye coordination, finger control, and precise movements through structured play.

The findings demonstrated an improvement in children's fine motor performance following the intervention. Before treatment, the largest proportion of children (30%) scored within the 20–22 interval. Following treatment, the largest proportion (48%) scored within the 27–29 interval. This shift suggests an overall improvement in fine motor performance among the participating children.

Table 12. Frequency Distribution of Pretest Scores

Score interval	Frequency	Percentage
14–16	4	17%
17–19	6	26%
20–22	7	30%

23–25	3	13%
26–28	3	13%
Total	**23**	**100%**

Table 13. Frequency Distribution of Posttest Scores

Score interval	**Frequency**	**Percentage**
21–23	4	17%
24–26	4	17%
27–29	11	48%
30–32	4	17%
Total	**23**	**100%**

The descriptive findings were consistent with the statistical analysis, which showed an increase in the mean score from 20.39 to 27.04. The paired-samples t-test also confirmed a statistically significant difference between the two measurements, $t(22) = -7.508$, $p < .001$. These results suggest that participation in circuit games was associated with improved fine motor performance in the group studied.

The observed improvements were reflected in children's increasing ability to manipulate play materials, control hand and finger movements, and complete activities requiring accuracy and coordination. The sequential nature of the circuit games also allowed

children to engage in different fine motor tasks within a structured and interactive learning environment.

Overall, the findings indicate that circuit games may serve as a practical play-based activity for supporting fine motor development in early childhood education. However, because the study employed a one-group pretest–posttest design without a control group, the observed improvements cannot be attributed exclusively to the intervention. Further research using comparison groups and equivalent pretest and posttest tasks would provide stronger evidence of its effectiveness.

Conclusion

This study revealed a significant improvement in children's fine motor skills following the implementation of circuit games at RA Perwanida 4 Palembang. The mean score increased from 20.39 in the pretest to 27.04 in the posttest, indicating improvements in hand–eye coordination, finger movement control, and movement precision. These findings suggest that circuit games can be considered a promising play-based activity for supporting fine motor development in early childhood education. Teachers are encouraged to adapt circuit game activities to children's developmental needs and abilities. Future research should explore different circuit game variations and involve larger samples and control groups to provide stronger evidence of their effectiveness.

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