



Original Article

The Effect of Coloring Stimulation to Improve Children's Fine Motor Development at Aisiyiah Kindergarten Sungai Alang Branch Karang Intan

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ABSTRACT

Preschool children (ages 3–6 years) are in their golden age of development, during which physical and psychological maturity progress rapidly. Fine motor skills are particularly important, as they support later academic abilities such as writing and drawing. This study aimed to determine the effect of coloring stimulation on the fine motor development of preschool children at Aisiyiah Kindergarten, Sungai Alang Branch, Karang Intan. This research employed a quantitative, quasi-experimental design using one group pretest–posttest without a control group. The study involved 18 children in class B. Fine motor development was measured using an observation rubric, and data were analyzed with the Wilcoxon signed-rank test. Before the intervention, the mean fine motor score was 3.89 (range 3–5). After five sessions of coloring stimulation, the mean score increased to 10.11 (range 8–12). Statistical analysis showed a significant difference (p -value=0.001, $p<0.005$), indicating that coloring stimulation had a measurable impact on children's fine motor development. Coloring stimulation significantly improves preschool children's fine motor skills. Both teachers and parents are encouraged to provide regular coloring activities as a simple, enjoyable, and effective strategy to optimize children's developmental outcomes.



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INTRODUCTION

According to the *WHO–UNICEF Global Report on Children with Developmental Disabilities* (2023), an estimated 317 million children and adolescents worldwide are affected by conditions contributing to developmental disabilities. These include impairments in motor, cognitive, communication, and sensory functions, which can significantly impact early childhood growth and learning outcomes, particularly among preschool-aged children.¹

Based on data from the Stimulation of Early Detection and Intervention of Growth and Development (SDIDTK) services from the Banjar District Health Service in 2023, out of 32,799 children, 0.20% were detected as having fine motor development disorders, 0.09% children as having gross motor development disorders, and 0.34% children were detected to have speech and language development disorders, and 0.05% children were detected to have independent socialization disorders. Delays in the development of smooth muscles cause children to have difficulty writing because it is difficult for children to coordinate the movements of their hands and fingers.² Thus, it is necessary to provide stimulation to children as early as possible to improve fine motor development in children. Providing stimulation carried out independently at home by parents is an important factor in improving children's development.³

Stimulation can be done in several ways to support it with examples of thinking, inviting children to chat, teaching something new or inviting children to play.³ There are various types of games that can be used to improve fine motor skills such as drawing, sticking shapes, tracing, folding paper, connecting dots, and coloring.⁴ Coloring is a very fun activity and easy to do.⁵ Motor aspects that can be assessed from the activity of playing coloring pictures include: how to hold the coloring tool, moving the wrist, and coloring neatly.⁵

Based on the SDIDTK from the Karang Intan 2 Community Health Center, of the 52 children at Aisiyiah Kindergarten, Sungai Alang Branch, Karang Intan who underwent SDIDTK services, there were three children detected with socialization development disorders, three children with speech disorders, and two children detected with Attention Deficit Disorder)/Hyperactivity (ADHD). Based on the report cards of 18 children in Kindergarten B semester 1 of the 2023/2024 academic year, the fine motor aspect of the indicator of carrying out manipulative movements to produce a shape using various media is that four children are starting to develop and three children are developing according to expectations. In the indicator of coordinating eyes and hands to carry out complex movements, there were five children starting to develop and two children Developing According to Expectations.

Fine motor skills also influence the child's independence, the worse the child's fine motor skills, the lower the child's level of independence.⁶ Providing stimulation can improve children's motor development so that they do not experience delays and develop according to their age.⁷

Based on the issues aroused, this research is conducted to determine the effect of coloring stimulation to improve children's fine motor development among children, specifically children at Kindergarten Aisiyiah Branch Alang River, Karang Intan. It is expected that this research offers more insight of the effect of coloring stimulation in improving children's fine motor development and inspires Kindergarten teachers to consider the implementation of coloring stimulation to improve children's fine motor development.

METHODS

This research was carried out in Class B of Aisiyiah Kindergarten, Sungai Alang Branch, Karang Intan for five meetings with coloring stimulation intervention. This research is a quantitative research using quasi experimental methods. The design that will be used is a one group pre- and post-test without a control design. Assess the development of children's fine motor skills before and after being given coloring stimulation. By using a without control design, researchers use time efficiently during the research. So focus on one group being studied. The intervention that will be provided in this research is coloring stimulation.

The population in this study were all class B children at Aisiyiah Kindergarten, Sungai Alang Branch, Karang Intan with a total of 18 children. This research uses sampling techniques nonprobability with the total sampling method.

Researchers used a research instrument in the form of an assessment rubric developed by to assess fine motor skills in coloring play activities. The assessment categories for measuring children's fine motor development here are not yet developed, starting to develop, developed as expected, and developed very well.

The data collection technique used is primary data obtained from an assessment rubric for measuring children's fine motor development achievements. As well as secondary data obtained from teachers regarding the number of class B children in Aisiyiah Kindergarten, Sungai Alang Branch, Karang Intan (Research Ethics Approval No. 501/KEPK-PKB/2024 issued by the Health Research Ethics Committee of Poltekkes Kemenkes Banjarmasin). Researchers have received permission to conduct research at this location after completing ethics.

RESULTS

Table 1. Children's fine motor skills before coloring stimulation

Pre test	n	%
Not yet developed	7	38.9
Starting to develop	11	61.1
Total	18	100

Based on the above table, the results show that most of the children's fine motor skills before the coloring stimulation were given, namely 11 children (61.1%) were in the starting to develop category.

Table 2. Children's fine motor skills after coloring stimulation

Post test	n	%
Developed as expected	6	33.3
Developed very well	12	66.7
Total	18	100

Based on the table above, the results showed that most of the children's fine motor skills after giving coloring stimulation were 12 children (66.7%) who were at the very well developed stage and six children (33.3%).

Table 3 Frequency Distribution of Children's Fine Motor Development

Variables	pre test		Post test	
	n	%	n	%
Age				
5 years old	12	66.7	12	66.7
6 years old	6	33.3	6	33.3
Gender				
Female	10	55.6	10	55.6
Male	8	44.4	8	44.4
Categories				
Not yet developed	7	38.9	0	0.0
Starting to develop	11	61.1	0	0.0
Developed as expected	0	0.0	6	33.3
Developed very well	0	0.0	12	66.7

The pre test was carried out by 18 respondents, 12 respondents aged 5 years and 6 respondents aged 6 years. There were 10 female respondents and 8 male respondents. When the pre test was carried out, an assessment was carried out and it was found that the children were in the not yet developed and starting to develop categories.

When the post test was carried out, all respondents took it. The results obtained were that after giving coloring stimulation, children were in the developed as expected and developed very well categories.

Table 4. Effect of Coloring Stimulation to Improve Children's Fine Motor Development

Fine Motor Development	Mean	Min-Max	Mean Difference	p-value
Pre test	3.89	3-5	9.50	0.001
Post test	10.11	8-12		

Based on the table above, the results showed that the development of fine motor skills in preschool children before and after being given coloring stimulation at Aisyiyah Kindergarten, Sungai Alang Branch, Karang Intan, the average value before being given coloring stimulation was 3.89, while after being given coloring stimulation was 10.11. The minimum and maximum values also shifted, from 3–5 at pre test to 8–12 at posttest. This indicates a substantial improvement in children's fine motor skills after receiving coloring stimulation. If we look at the results, the average difference before and after the coloring stimulation is given is 9, 50. The results of statistical tests on pre test and posttest fine motoric development using the Wilcoxon test from 18 respondents showed a significant value of ($p=0.001$), $p\text{-value} < \alpha$ ($0.000 < 0.005$). This result means that the null hypothesis (H_0) was rejected, supporting the conclusion that there was a statistically significant difference between children's fine motor skills before and after the intervention. The strength of this evidence shows that the improvement observed is not merely due to chance, but directly associated with the intervention provided. This was supported during the research. Before stimulation is given, the child is still in the not yet developed category. After being given coloring stimulation, the child's fine motor development increased and was in the developed very well category.

From a practical perspective, this finding has important implications for early childhood education. The significant improvement demonstrates that coloring activities are not only enjoyable for children but also serve as an effective pedagogical tool for enhancing fine motor coordination, hand strength, and eye–hand integration.⁸ These skills are foundational for later academic tasks such as writing, drawing, and self-care activities. For teachers, integrating structured coloring stimulation into daily classroom routines could become a simple yet impactful strategy to support children's readiness for formal schooling. For parents, these results highlight the importance of continuing similar activities at home, thereby ensuring consistency of stimulation and optimizing children's developmental outcomes.⁹

DISCUSSION

1. Fine Motor Before Coloring Stimulation

Fine motor development involves the coordination of small muscles, particularly in the fingers and wrists, as well as eye–hand coordination. At baseline, many children at Aisyiyah Kindergarten, Sungai Alang Branch, Karang Intan showed difficulties in holding coloring tools correctly, moving their wrists smoothly, and coloring within boundaries. Ideally, children should hold coloring tools using the thumb, index, and middle fingers while stabilizing with the remaining fingers, yet this was not consistently observed.

Interviews with parents revealed that most of them rarely provided independent stimulation at home. Many were unaware of developmental milestones and the importance of early interventions. According to researchers, stimulation needs to be given from an early age to optimize fine motor skills. Child development occurs through a process of maturation and learning from the environment, which interact with each other to shape outcomes.¹⁰

Delayed child growth and development is a global problem in several countries. Children with developmental barriers may experience intellectual and learning difficulties when entering school, which can persist into adulthood.¹¹ Such delays also prevent children from performing developmental tasks appropriate to their age. Moreover, disturbances in fine motor development can create obstacles in learning, leading to behavioral issues such as laziness in writing, reduced interest in learning, and low self-esteem.¹² These findings emphasize the importance of early and consistent stimulation to support optimal child development.

2. Improvements in Fine Motor Skills After Coloring Stimulation

Based on the data presented above, the researchers assume that there will be an increase in children's fine motor development during the coloring stimulation intervention. During coloring activities, children really like to add color to fill in the image space that needs to be colored. If children are happy or like doing certain activities, the goal of providing maximum stimulation can be achieved. According to researchers assumptions, fine motor skills begin to

improve, after starting with very simple activities. Repeated coloring activities for children to determine the development of their fine motor skills are said to be successful because in fact after carrying out this activity the results are that many children develop very well and develop according to expectations.¹³

These findings are consistent with previous studies reporting that children who receive structured and regular stimulation develop more quickly than those who do not.¹⁴ If stimulation is carried out consistently, developmental progress increases, particularly in fine motor abilities.¹⁵ The preschool years are a particularly sensitive period because the neural pathways controlling fine motor coordination mature rapidly, making this stage critical for targeted interventions.¹⁶ Repeated coloring activities also created a positive learning environment, as children enjoyed the tasks, which further enhanced the effectiveness of the stimulation.¹⁷

3. Effect of Coloring Stimulation to Increase Fine Motor Development

Before the coloring stimulation intervention was carried out, it was found that 7 children experienced delays in fine motor development. After being given coloring stimulation there was a change in the children's fine motor development from not yet developed to very well developed.

In summary, coloring stimulation was found to significantly enhance fine motor skills across three assessed aspects: proper grip, wrist movement, and neatness. Most children shifted from undeveloped categories to developing according to expectations or very well developed. Beyond measurable outcomes, coloring provided a fun, engaging, and low-cost activity that encouraged consistency both at school and at home.¹⁸

From a practical perspective, these findings highlight important implications for early childhood education. For teachers, integrating coloring activities into daily classroom routines can be a simple yet powerful pedagogical tool to strengthen fine motor coordination, hand strength, and eye-hand integration, skills that form the foundation for writing, drawing, and self-care. For parents, continuing such activities at home ensures consistency of stimulation and supports children's readiness for future academic tasks. Previous studies also emphasize that children who receive early and structured stimulation are more likely to achieve developmental milestones.^{19, 20, 21}

Through the stimulation of coloring play activities, children can train several skills such as the child's ability to coordinate fine motor movements, namely between the hands and eyes, children practice paying attention to the characteristics of the image to be colored, recognizing its characteristics such as the right color according to the shape of the image, and train children to develop creativity in coloring various pictures.²²

According to researchers, coloring activities are very appropriate in improving children's fine motor skills by using a variety of coloring tools so that finger, wrist and hand-eye coordination skills improve according to their development. Coloring pictures is a learning method that can train children's concentration and can train children's fingers.²³ Fine motor skills are abilities that require fine muscle skills in the body, such as skills in using your fingers, moving your wrists so they are flexible, and coordinating your eyes and hands well, such as: folding, coloring, drawing, painting, and so on.²⁴

Coloring stimulation can be given by parents independently at home.²⁵ Apart from being able to improve children's fine motor development, providing coloring stimulation can also keep the relationship between children and parents closer.

The coloring stimulation can influence the development of fine motor skills of children, based on the results of this research. This research provides more insights of the use of coloring stimulation to improve children's fine motor skills. Thus, it is important to provide coloring stimulation to children which can be achieved by parents at home. Moreover, this research offers insights for the Kindergarten teachers to implement coloring stimulation in the class in attempt for the development of fine motor skills.

CONCLUSION

Children's fine motor skills in class B at Aisyiyah Kindergarten, Sungai Alang Branch, Karang Intan, improved significantly after receiving coloring stimulation, moving from early stages of development to developing according to expectations and very well developed. Coloring stimulation is therefore proven effective in enhancing preschool children's fine motor abilities.

It is recommended that teachers routinely integrate structured coloring activities into classroom learning, while parents provide similar stimulation at home through regular coloring sessions. Consistent practice at school and home will help optimize children's fine motor development and support readiness for future academic tasks.

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