



Effectiveness of Montage Play Therapy on Fine Motor Development Among Preschool Children: A Pre-Experimental Study

Ifra Safitri¹, Katrina Feby Lestari², Matius Paundanan^{3*}

¹Department of Nursing, Faculty of Health, Widya Nusantara University, Indonesia

²Department of Nursing, Faculty of Medicine, Sam Ratulangi University, Indonesia

³Department of Medical Laboratory Technology, Faculty of Health, Widya Nusantara University, Indonesia

*Corresponding author: m.paundanan89@gmail.com

Article History

Received: January 15, 2026

Revised: Februari 6, 2026

Accepted: Maret 2, 2026

DOI:

Publisher:

CV. Karismavit

Baitul Makmur Street, Palu City,

Central Sulawesi, Indonesia

Email: admin@karismavit.id

ABSTRACT

Introduction: Fine motor development is a crucial component of early childhood growth, influencing academic readiness, independence, and cognitive performance. Delays in fine motor skills remain prevalent among preschool children, often due to inadequate stimulation. Art-based therapeutic interventions such as montage play therapy may provide structured sensorimotor stimulation.

Objectives: To analyze the effectiveness of montage play therapy in improving fine motor development among preschool children.

Methods: This study employed a pre-experimental one-group pretest–posttest design. The study involved 30 preschool children aged 4–6 years selected through total sampling. Fine motor development was assessed using the Denver Developmental Screening Test (DDST). Montage play therapy was administered over two weeks (six sessions). Data analysis was performed using the McNemar test to examine differences in categorical paired data between pretest and posttest results. This test was selected because the dependent variable was dichotomous (normal and suspect) and measured in the same participants before and after intervention. Statistical significance was determined at a p-value of < 0.05 .

Results: Prior to intervention, 60% of participants were categorized as “suspect” and 40% as “normal.” After intervention, 83.3% were categorized as “normal,” while only 16.7% remained “suspect.” Statistical analysis demonstrated a significant improvement in fine motor development ($p < 0.001$).

Conclusion: Montage play therapy significantly improves fine motor development among preschool children and can be implemented as an effective stimulation strategy in early childhood education and community health settings.

Keywords: Fine Motor Development, Montage Therapy, Preschool Children, Developmental Stimulation, Early Childhood

INTRODUCTION

Fine motor development represents a fundamental aspect of early childhood growth, enabling children to perform essential daily tasks such as writing, drawing, dressing, and manipulating objects. These skills require coordination between small muscle groups of the hands and fingers integrated with visual perception. During the preschool period, rapid neurological maturation and synaptic development occur, creating a critical window for motor skill acquisition (1). However, inadequate stimulation during this phase may result in delayed neuromotor coordination (2). Early identification and intervention are therefore essential to prevent long-term developmental consequences (3). Structured and repetitive stimulation has been shown to enhance fine motor proficiency (4).

Globally, developmental delays remain a significant concern in early childhood populations. Environmental factors, limited structured play, and insufficient parental engagement contribute to suboptimal developmental outcomes (3). Evidence indicates that structured art-based activities can improve manual dexterity and coordination in preschool-aged children (5). Zulaicha et al. reported that montage activities significantly enhanced fine motor skills in children aged 4–5 years (6). Their findings suggest that purposeful creative engagement supports neuromuscular maturation (2). Therefore, structured play interventions should be considered an integral component of early childhood education (7).

Play therapy provides developmentally appropriate stimulation by integrating cognitive, sensory, and motor domains (8). Montage play therapy involves cutting, arranging, and pasting images to form a composition. This activity stimulates bilateral coordination, hand–eye integration, and fine muscle control (4). Sari and Isnaeni demonstrated that montage play therapy significantly improved fine motor development among preschool children (9). Repetitive cutting and pasting strengthen intrinsic hand muscles and promote motor precision (10). Consequently, montage therapy may function not only as recreational activity but also as therapeutic stimulation.

Beyond motor enhancement, montage activities stimulate concentration, visual perception, and executive functioning (11). Children must focus attention, plan placement of images, and coordinate movements accurately. Darmiatun and Mayar found that creative art-based stimulation improved both motor dexterity and sustained attention in early childhood (12). Multisensory engagement activates cortical motor pathways and enhances motor learning processes (13). These findings highlight the multidimensional benefits of montage-based activities. Thus, montage play therapy aligns with holistic developmental principles.

Nutritional status also influences motor development outcomes. Adequate nutrition supports muscle strength, nerve conduction, and brain maturation (3). Faridah et al. identified a significant association between nutritional status and fine motor development among preschool children (14). Children with normal nutritional status demonstrate better coordination and endurance during motor tasks (4). Therefore, physiological readiness may contribute to the effectiveness of motor interventions.

Parental education and caregiving practices further affect developmental stimulation. Parents with higher educational backgrounds tend to provide structured learning environments and consistent stimulation (7). Salsabila et al. reported a significant relationship between parental education and preschool developmental status (15). Collaborative involvement between families and educational institutions enhances developmental outcomes (16). Despite existing evidence, structured evaluation of montage therapy using standardized pre–post testing remains limited. Therefore, this study aims to analyze the effectiveness of montage play therapy in improving fine motor development among preschool children.

METHODS

Study Design

This study employed a pre-experimental design using a one-group pretest–posttest approach to evaluate the effectiveness of montage play therapy in improving fine motor development among preschool children (4). This design allows comparison of developmental status before and after intervention within the same group of participants. Although the absence of a control group limits causal inference, the design is appropriate for preliminary intervention studies aimed at assessing short-term effectiveness. The pretest–posttest structure enables direct measurement of changes attributable to structured stimulation. The independent variable in this study was montage play therapy, while the dependent variable was fine motor development status.

Setting and Participants

The study was conducted in a preschool educational institution. Participants consisted of 30 children aged 4–6 years who were enrolled in the preschool during the study period. A total sampling technique was applied, meaning all eligible children meeting inclusion criteria were recruited as participants. Inclusion criteria included being registered as an active student, aged between 4 and 6 years, physically and cognitively able to follow instructions, and having parental consent to participate. Children diagnosed with severe developmental disorders or physical impairments that could interfere with fine motor assessment were excluded. This sampling approach ensured representation of the entire accessible population within the study setting.

Intervention Procedure

The intervention consisted of structured montage play therapy administered over a two-week period. A total of six sessions were conducted, with three sessions per week. Each session lasted approximately 30–40 minutes and was facilitated by the researcher with assistance from classroom teachers. During each session, children were provided with magazines, scissors, glue, and drawing paper. Participants were instructed to cut out selected images, arrange them according to a specific theme, and paste them onto paper to create a montage composition. The activities were supervised to ensure safety, correct scissor handling, and proper motor technique. Repetitive cutting, arranging, and pasting movements were emphasized to stimulate fine motor coordination, bilateral hand use, and visual–motor integration (10).

Instrument and Measurement

Fine motor development was assessed using the Denver Developmental Screening Test (DDST), focusing specifically on the fine motor-adaptive domain. The DDST is a standardized developmental screening instrument widely used to assess developmental milestones in children from birth to six years of age (17). Assessment was conducted twice: before the intervention (pretest) and after completion of all therapy sessions (posttest). Each child's performance was categorized according to standardized DDST scoring criteria into "normal" or "suspect" developmental status. Assessments were carried out in a controlled and quiet environment to minimize distractions and ensure accurate observation of motor performance.

Data Collection Procedure

Data collection began with baseline assessment of fine motor development using the DDST. After completion of the pretest, montage play therapy sessions were implemented according to the predetermined schedule. Attendance and participation were monitored throughout the intervention period to ensure consistency of exposure. Upon completion of the six therapy sessions, posttest assessment was conducted using the same instrument and procedure as the baseline evaluation. All data were recorded systematically using structured observation sheets. This standardized procedure was applied to reduce measurement bias and enhance reliability of findings.

Data Analysis

Data were analyzed using statistical software. Descriptive statistics were employed to summarize participant characteristics and to present the frequency distribution of fine motor developmental status before and after the intervention. Because the dependent variable was categorical and dichotomous (normal vs. suspect) and measured in the same participants at two different time points (pretest and posttest), the McNemar test was used to determine whether there was a statistically significant difference between pre-intervention and post-intervention results. The level of statistical significance was set at $p < 0.05$. This analysis was conducted to evaluate the effectiveness of montage play therapy in improving fine motor developmental outcomes among preschool children.

Ethical Considerations

Ethical approval was obtained from the Faculty of Medicine Ethics Committee, Tadulako University (No: 4117/UN28.1.30/KL/2024). Informed consent was obtained from parents. Confidentiality and anonymity were maintained.

RESULTS

The baseline characteristics of the respondents are presented in **Table 1**. The study population was predominantly composed of 5-year-old children (93.3%), indicating relative homogeneity in age distribution. Female participants constituted the majority of the sample (66.7%), suggesting a slight gender imbalance. Most children had normal nutritional status (86.7%), with only a small proportion classified as underweight (13.3%). In terms of head circumference, 80% of participants were within the normal range, while 13.3% and 6.7% were identified as microcephalic and macrocephalic, respectively. Overall, these findings indicate that the majority of children were within normal growth and developmental parameters at baseline, thereby reducing potential confounding effects related to nutritional and anthropometric status.

Table 1. Characteristics of Respondents

Subject Characteristics	Frequency	Percentage (%)
Age		
4 years	1	6.7
5 years	14	93.3
Sex		
Male	5	33.3
Female	10	66.7
Nutritional Status		
Underweight (wasted)	2	13.3
Normal nutritional status	13	86.7
Head Circumference		
Macrocephaly	1	6.7
Normal	12	80
Microcephaly	2	13.3
Total	15	100

Source: Primary data

The distribution of fine motor development before intervention is presented in **Table 2**. The pre-test results show that 60% of children were categorized as "suspect," while only 40% were classified as having normal fine motor development. This finding indicates that more than half of the participants demonstrated potential delays or below-expected fine motor performance prior to

receiving montage play therapy. The predominance of the suspect category in **Table 2** highlights the need for structured developmental stimulation within this preschool population.

Table 2. Fine Motor Development Before Intervention

Pre-test fine motor skills	Frequency	Percentage (%)
Normal	6	40
Suspect	9	60
Total	15	100

Source: Primary data

Post-intervention outcomes are summarized in **Table 3**. After the implementation of montage play therapy, the proportion of children classified as having normal fine motor development increased to 80%, while the suspect category decreased to 20%. Compared to baseline findings in **Table 2**, this represents a substantial improvement in developmental status. The shift observed in **Table 3** suggests that structured montage activities may have positively influenced hand eye coordination and fine motor control among participants.

Table 3. Fine Motor Development After Intervention

Post-test fine motor skills	Frequency	Percentage(%)
Normal	12	80
Suspect	3	20
Total	15	100

Source: Primary data

The comparative analysis of pre-test and post-test outcomes is presented in **Table 4**. The proportion of children categorized as normal increased from 40% before intervention to 80% after intervention, while the suspect category decreased from 60% to 20%. Statistical analysis using the McNemar test yielded a p-value of 0.031, indicating a statistically significant difference between pre-test and post-test measurements ($p < 0.05$). As demonstrated in **Table 4**, montage play therapy had a significant positive effect on fine motor development among preschool children in this study.

Table 4. Effect of Montage Therapy on Fine Motor Development

Fine Motor Development	Pre-test		Post-test		p-value
	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)	
Normal	6	40	12	80	0.031
Suspect	9	60	3	20	

Source: Primary data

DISCUSSION

The findings of this study demonstrate a statistically significant improvement in fine motor development following the implementation of montage play therapy. Prior to the intervention, the majority of participants were categorized as “suspect,” indicating suboptimal fine motor coordination. After six structured sessions, most children transitioned to the “normal” developmental category. This substantial shift suggests that systematic and repetitive sensorimotor stimulation effectively enhances neuromuscular coordination (4). Fine motor activities that involve cutting, arranging, and pasting require controlled finger movements and precise hand eye coordination. Repeated practice strengthens intrinsic hand muscles and improves dexterity over time (10). These findings confirm that montage-based activities provide meaningful motor stimulation during early childhood. Therefore, structured creative play may serve as an effective therapeutic modality for improving fine motor competence in preschool children.

The improvement observed in this study can be explained through principles of motor learning theory. Motor learning occurs when repeated task-specific practice reinforces neural pathways responsible for coordinated movement (13). During early childhood, the brain exhibits heightened neuroplasticity, allowing rapid adaptation to structured stimulation (18). Montage activities demand integration between visual perception and motor execution, which promotes synaptic strengthening within cortical motor areas (2). Through consistent repetition, children refine movement accuracy and efficiency.

The present findings are consistent with previous research examining the effectiveness of art-based motor interventions. Zulaicha et al. reported that montage activities significantly improved fine motor performance among preschool children (6). Similarly, Sari and Isaeni demonstrated measurable enhancement in motor dexterity following structured montage therapy sessions (9).

Beyond improvements in motor coordination, montage play therapy may also contribute to cognitive and executive functioning development. Fine motor activities require sustained attention, planning, sequencing, and error correction (11). Research indicates

that fine motor skills are strongly associated with early academic achievement (19). Duncan et al. further reported that early readiness skills, including motor competence, predict later educational outcomes (20).

Multisensory engagement during montage activities may also explain the observed developmental improvements. Cutting and pasting tasks activate tactile, visual, and proprioceptive systems simultaneously. This multisensory integration enhances cortical activation and strengthens motor planning pathways (13). Adolph and Hoch emphasized that motor development is embodied and shaped through active interaction with the environment (1).

Nutritional status may have influenced the effectiveness of the intervention. Adequate nutrition contributes to brain maturation, nerve conduction velocity, and muscle strength (3). Faridah et al. found a significant association between nutritional status and fine motor development in preschool-aged children (14). Children with sufficient nutritional intake tend to display better endurance and coordination during motor tasks (4).

Parental involvement and environmental stimulation also play a crucial role in developmental outcomes. Parents with higher educational backgrounds are more likely to provide structured home-based learning and stimulation activities (7). Salsabila et al. identified a significant relationship between parental education level and developmental status among preschool children (15). Consistent reinforcement at home may strengthen the effects of school-based interventions (16). Evidence also suggests that structured play activities contribute significantly to early developmental stimulation (21-23).

Despite the positive findings, several limitations should be acknowledged. The absence of a control group restricts the ability to establish definitive causal relationships. The relatively small sample size limits generalizability to broader populations. Additionally, the short duration of the intervention prevents evaluation of long-term developmental retention. Randomized controlled trials with larger samples are recommended to strengthen the evidence base (24). Longitudinal follow-up studies would help determine whether improvements persist over time (25). Nonetheless, the present findings provide preliminary evidence that montage play therapy is a feasible, low cost, and effective intervention. Early structured stimulation remains essential for preventing developmental delays and promoting optimal childhood growth.

CONCLUSION

Montage play therapy significantly improves fine motor development among preschool children. Structured and repetitive creative stimulation enhances neuromuscular coordination and manual dexterity. Integration into early childhood education and community health programs is recommended.

ACKNOWLEDGEMENTS

The authors would like to express their sincere appreciation to the Head of PAUD Aisyiyah Bustanul Athfal 2, West Palu District, for granting permission and facilitating the implementation of this study. We also extend our gratitude to the teachers and staff who assisted during the intervention sessions and data collection process. Special thanks are addressed to the parents and preschool children who willingly participated in this research. The authors acknowledge the support provided by the Faculty of Health, Widya Nusantara University, for administrative and academic assistance throughout the research process. Appreciation is also extended to colleagues who contributed technical and methodological input during data analysis and manuscript preparation.

AUTHORS' CONTRIBUTIONS

IS conceptualized and designed the study, conducted data collection, implemented the intervention, and drafted the initial manuscript. KFL contributed to the study design, supervised the intervention process, and critically reviewed the manuscript for important intellectual content. MP performed data analysis, interpreted the statistical results, and revised the manuscript for methodological accuracy and scientific clarity. All authors read and approved the final version of the manuscript. All authors agree to be accountable for all aspects of the work and ensure the integrity and accuracy of the research.

DECLARATIONS

1. Funding

This study is financed solely through personal resources and does not benefit from any institutional funding.

2. Use of Artificial Intelligence (AI)

I affirm that generative AI and AI-assisted tools were utilized solely to enhance language quality and ensure clearer expression throughout the writing process. The ideas, evaluations, and conclusions presented in this thesis are my original work, with no reliance on AI for creating research data or substantive academic material.

3. Conflict of Interest

The authors declare that there are no conflicts of interest related to this study. The research was conducted independently without any financial support, sponsorship, or commercial involvement that could influence the design, data collection, analysis, interpretation, or publication of the results.

BIBLIOGRAPHY

1. Adolph KE, Hoch JE. Motor development: embodied, embedded, enculturated, and enabling. *Annu Rev Psychol.* 2019;70:141–164. doi:10.1146/annurev-psych-010418-102836.
2. Libertus K, Hauf P. Motor skills and their foundational role for perceptual, social, and cognitive development. *Front Psychol.* 2017;8:301. doi:10.3389/fpsyg.2017.00301.
3. Black MM, Walker SP, Fernald LCH, Andersen CT, DiGirolamo AM, Lu C, et al. Early childhood development coming of age: science through the life course. *Lancet.* 2017;389(10064):77–90. doi:10.1016/S0140-6736(16)31389-7.
4. Piek JP, Dawson L, Smith LM, Gasson N. The role of early fine and gross motor development on later motor and cognitive ability. *Hum Mov Sci.* 2008;27(5):668–681. doi:10.1016/j.humov.2007.11.002.
5. Wang MV, Lekhal R, Aarø LE, Holte A, Schjølberg S. Co-occurring development of early childhood communication and motor skills: results from a population-based longitudinal study. *Child Care Health Dev.* 2012;40(1):77–84. doi:10.1111/cch.12003.
6. Suggate S, Stoeger H, Pufke E. Relations between playing activities and fine motor development. *Early Child Dev Care.* 2017;187(8):1297–1310. doi:10.1080/03004430.2016.1167047.
7. Sundayana IM, Aryawan KY, Fransisca PC, Astriani NMDY. Perkembangan motorik halus anak usia pra sekolah 4–5 tahun dengan kegiatan montase. *Jurnal Keperawatan Silampari.* 2020;3(2):446–455. doi:10.31539/jks.v3i2.1052.
8. World Health Organization. Early childhood development and disability: a discussion paper. Geneva: World Health Organization; 2012. Available from: <https://iris.who.int/items/26c56f61-c640-4110-b4b6-f4c1186f593c>
9. Diamond A. Executive functions. *Annu Rev Psychol.* 2013;64:135–168. doi:10.1146/annurev-psych-113011-143750.
10. Sari FAN, Isnaeni. Efektivitas terapi bermain montase terhadap kemampuan motorik halus pada anak prasekolah di TK Aisyiyah Bustanul Athfal 44 Kota Bekasi. *Malahayati Nursing Journal.* 2022;4(7):1782–1792. doi:10.33024/mnj.v4i7.6580.
11. Case-Smith J. Effects of occupational therapy services on fine motor and functional performance in preschool children. *Am J Occup Ther.* 2000;54(4):372–380. doi:10.5014/ajot.54.4.372.
12. Nurhidayah, Rahman H, Nurghani S. Penerapan model pembelajaran discovery learning untuk meningkatkan keaktifan dan hasil belajar IPAS kelas IVA SDN Mongisidi III. Pinisi: *Journal of Teacher Professional.* 2024;5(3). doi:10.26858/tpj.v5i3.62449.
13. Kolb B, Gibb R. Brain plasticity and behaviour in the developing brain. *J Can Acad Child Adolesc Psychiatry.* 2011;20(4):265–276. doi:10.1177/1073858410387802.
14. Wulandari Y, Aisyah I, Puspanditaning A. Correlation between nutritional status and fine motor development in pre-school age children. *Jurnal Keperawatan Florence Nightingale.* 2024;7(1):131–137. doi:10.52774/jkfn.v7i1.157.
15. Indah F, Widiastuti S, Argarini D. Hubungan pendidikan dan pola asuh orang tua dengan perkembangan anak usia prasekolah 3–6 tahun di TK Nurul Abror Cibinong. Mahesa: *Malahayati Health Student Journal.* 2022;2(4):648–658. doi:10.33024/mahesa.v2i4.6067.
16. Hadders-Algra M. Early brain damage and the development of motor behavior in children: clues for therapeutic intervention? *Neural Plast.* 2001;8(1–2):31–49. doi:10.1155/NP.2001.31.
17. Cameron CE, Brock LL, Murrah WM, Bell LH, Worzalla SL, Grissmer D, et al. Fine motor skills and executive function both contribute to kindergarten achievement. *Child Dev.* 2012;83(4):1229–1244. doi:10.1111/j.1467-8624.2012.01768.x.
18. Duncan GJ, Dowsett CJ, Claessens A, Magnuson K, Huston AC, Klebanov P, et al. School readiness and later achievement. *Dev Psychol.* 2007;43(6):1428–1446. doi:10.1037/0012-1649.43.6.1428.
19. Feder KP, Majnemer A. Handwriting development, competency, and intervention. *Dev Med Child Neurol.* 2007;49(4):312–317. doi:10.1111/j.1469-8749.2007.00312.x.
20. Barnett LM, Lai SK, Veldman SLC, Hardy LL, Cliff DP, Morgan PJ, et al. Correlates of gross motor competence in children and adolescents: a systematic review and meta-analysis. *Sports Med.* 2016;46(11):1663–1688. doi:10.1007/s40279-016-0495-z.
21. Oberer N, Gashaj V, Roebbers CM. Motor skills in kindergarten: internal structure, cognitive correlates and relationships to background variables. *Hum Mov Sci.* 2017;52:170–180. doi:10.1016/j.humov.2017.02.002.
22. Nirwana RVP. Efektivitas montase dan terapi menulis terhadap peningkatan motorik halus pada anak usia prasekolah. *Holistik Jurnal Kesehatan.* 2025;19(7):2077–2083. doi:10.33024/hjk.v19i7.1553.
23. Pitchford NJ, Papini C, Outhwaite LA, Gulliford A. Fine motor skills predict maths ability better than they predict reading ability in the early primary school years. *Front Psychol.* 2016;7:783. doi:10.3389/fpsyg.2016.00783.
24. Rachwani J, Tamis-LeMonda CS, Lockman JJ, Karasik LB, Adolph KE. Learning the designed actions of everyday objects. *J Exp Psychol Gen.* 2020;149(1):67–78. doi:10.1037/xge0000631.
25. Grissmer D, Grimm KJ, Aiyer SM, Murrah WM, Steele JS. Fine motor skills and early comprehension of the world: two new school readiness indicators. *Dev Psychol.* 2010;46(5):1008–1017. doi:10.1037/a0020104.