



Dancing on Paper: Finger Painting for Fine Motor Skill Development in Early Childhood

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Abstract: This study aims to explore the process of fine motor development in early childhood through the “Dancing on Paper” intervention, focusing on how participation in the activity supports the development of fine motor skills within an early childhood education setting. Employing a qualitative single-case study design, this research examines changes in children’s physical dexterity and coordination through a structured multi-day artistic intervention. Data were collected from five selected participants to observe key indicators of fine motor skills, including finger muscle strength, hand–eye coordination, and movement flexibility. The collected data were analyzed using qualitative thematic analysis through the stages of data reduction, data display, and conclusion drawing. The results indicate that participation in finger painting activities enhances children’s ability to control fine muscle movements and supports their readiness for subsequent academic tasks, such as writing. The findings suggest that the sensory-rich characteristics of the “Dancing on Paper” activity provide effective stimulation for early childhood fine motor development. This study contributes to early childhood education practices by highlighting creative arts activities as an effective pedagogical strategy for supporting children’s physical development.

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Introduction

Early childhood represents a golden age where neurological and physical development occurs at an unprecedented rate. Among the various domains of development, fine motor skills the coordination of small muscle movements, usually involving the synchronization of hands and fingers with the eyes stand as a critical foundation for academic and daily living autonomy (Talango, 2020). For children aged 4–5 years, mastering these skills is not merely a physical milestone but a precursor to complex cognitive tasks such as writing, drawing, and self-care. However, traditional pedagogical approaches often rely on repetitive, paper-and-pencil drills that can stifle a child's natural curiosity and creative expression (Maatoke, 2025).

The importance of fine motor stimulation is well-documented in developmental psychology (Maharani, 2024). Vygotsky’s sociocultural theory suggests that children learn best through hands-on, meaningful activities that bridge the gap between their current abilities and their potential (Kurniati, 2025). Previous research has consistently demonstrated that tactile-based media can significantly enhance finger flexibility and hand eye coordination (Wahyuni, 2025). Despite these findings, many early childhood settings still struggle to implement activities that balance structured skill-building with unstructured creative play.



The current state of the art in fine motor research has shifted from observing simple outcomes to understanding the process of how children manipulate media (Wahyuningsih et al., 2023).

However, a critical gap in the existing literature remains: most studies focus primarily on the final product of children's artistic endeavors rather than the step by step physical and behavioral adaptations during the process (Bondi, 2022). There is a lack of qualitative evidence detailing how specific finger techniques such as the choice between thumb and index finger precision evolve during consecutive, thematic sensory tasks. To fill this empirical gap, this study introduces a creative arts intervention framework. The novelty of this research lies in its deep process oriented exploration of qualitative behavioral markers, including finger pressure, movement variations, and self-regulation strategies during media engagement. Therefore, this study aims to explore the fine motor development process of early childhood through the 'Dancing on Paper' finger painting intervention, focusing on understanding how structured participation in themed activities supports the micro-development of fine motor skills in an early childhood education setting. This research contributes to that shift by utilizing a case study approach to observe specific behavioral indicators such as finger pressure, movement variation, and focus during a multi-day finger painting intervention.

In the context of this study, five children (Gta, Tma, Zbr, Syf, and Jl) participated in a series of thematic finger painting tasks, ranging from depicting a prayer mat to forming dates and fruits for . These activities were designed to test various aspects of fine motor control. For instance, creating the dotting effect requires precise muscle inhibition and release. Observational data indicates that children naturally gravitate toward specific fingers to achieve efficiency. Gta and Syf, for example, preferred using their thumbs because it allowed them to finish the task faster and with more stability. In contrast, Tma, Zbr, and Jl utilized their index fingers, noting that it was easier for creating detailed dots. These choices reflect an emerging awareness of their own physical capabilities and ergonomic efficiency.

The observational findings highlight a high level of finger flexibility and hand eye coordination across the subjects (Fadia Haya, 2025). Gta demonstrated a stable thumb movement when creating date shapes, showing no signs of stiffness. Similarly, Tm's index finger movements were described as flexible, though he noted slight fatigue, which he managed by observing his peers before continuing a sign of social learning and self-regulation. Zbr's performance was marked by high enthusiasm and strong muscle pressure, which translated into precise placement of colors within the provided outlines. These detailed behavioral markers are essential because they provide a window into the child's muscular development that standardized testing often misses.

Furthermore, the Dancing on Paper intervention emphasizes the movement variation aspect. Documentation photos show children engaging in diverse tasks: Day 1 involved painting a *prayer mats*, Day 2 focused on the texture of dates, Day 3 required counting and placing specific fruit dots for *fruit ice*, and Day 4 involved the moon and star patterns. This progression from simple to complex patterns ensures a comprehensive stimulation of the small hand muscles (Anggraini, 2025). For example, Syf and Jl showed high precision in placing their fingers on small details, which is a significant indicator of advanced coordination for their age group. The ability to take just enough paint to avoid making a mess, as noted by Jl, also indicates a refined level of motor control and spatial awareness.

A critical gap addressed by this study is the integration of the child's subjective experience with objective motor assessments (Bondi, 2022). Most research focuses solely on the product (the finished painting), but through interviews, this study captures the why. When



children explain that they prefer dotting because it is easy or fun, they are expressing a level of comfort with the tactile medium that encourages longer engagement. Long-duration engagement is vital for muscle memory and the strengthening of the hand's intrinsic muscles. The documentation shows that by Day 4, the children were able to fill complex shapes like the crescent moon with a variety of colors and techniques, demonstrating both improved motor stamina and artistic confidence.

This case study serves to bridge the gap between theoretical motor development and practical classroom application (Sahara, 2021). By documenting the nuanced movements of children during finger painting, it provides evidence that sensory-based art is not just a leisure activity but a vital therapeutic and developmental tool (Melati & Desa, 2024). The findings suggest that when children are given the freedom to dance their fingers across paper, they develop the necessary strength, flexibility, and coordination required for their future academic journey (Maryanti, 2025). Therefore, this study aims to explore the fine motor development process of early childhood through the 'Dancing on Paper' intervention, focusing on understanding how participation in the activity supports the development of fine motor skills in an early childhood education setting.

Research Method

This study utilizes a qualitative approach with a single-case study design to explore the intricacies of fine motor stimulation through finger painting in early childhood. The case study framework was selected to provide an in-depth, longitudinal analysis of how specific artistic interventions influence the muscular coordination and tactile sensitivity of young learners within their natural classroom environment. By focusing on the Dancing on Paper series, the research captures nuanced behavioral shifts that quantitative measures might overlook.

The participants consisted of 15 children aged 4–5 years at TK Al-Amin, selected through a purposive sampling technique based on specific developmental and academic criteria relevant to the research objectives. From this broader cohort of 15 children, a focal sample of five key subjects (Gta, Tma, Zbr, Syf, and Jl) was intentionally selected for a detailed case analysis to capture a representative variance in fine motor engagement. The selection of these five children was strictly guided by explicit inclusion and exclusion criteria. The inclusion criteria required that the participants were aged 4–5 years, actively enrolled in the structured four-day "Dancing on Paper" intervention, and demonstrated distinct baseline variations in initial motor competencies ranging from hand stiffness to emergent finger flexibility. Furthermore, they must have maintained full attendance across all four thematic intervention phases namely the prayer mats, dates, fruit ice, and moon/star tasks to ensure complete observational data. Conversely, the exclusion criteria applied to eliminate potential confounding factors were the presence of any diagnosed physical or physiological impairments in upper limb motor functions that would alter typical neuromotor development, as well as prolonged absenteeism or incomplete participation in the subjective post-session interview phases. Through this systematic screening process, these five specific children were selected because their complete data sets provided unique behavioral profiles representing diverse ergonomic choices and variations in thumb and index finger usage. This selection allowed for a focused examination of how different children navigate the physical demands of finger painting, such as choosing between the thumb and index finger for precision.

Data collection was conducted through a triangulation of three primary techniques: observation, interviews, and documentation. Direct observations were recorded in descriptive



field notes, focusing on five behavioral indicators: finger flexibility, hand-eye coordination, finger muscle strength, movement variation, and perseverance/focus. Semi-structured interviews were performed following each session to capture the children's subjective experiences, such as their finger preferences and perceived difficulty levels. Finally, documentation involved high resolution photography and video recording of the painting process and the final artifacts, providing a visual record of the children's technical progression over the four-day intervention.

The research procedure was implemented over four distinct phases, corresponding to the four days of the intervention. On Day 1, children focused on the Sajadah pattern to establish baseline coordination. Day 2 introduced the date task, which required repetitive, controlled dotting movements to simulate texture. Day 3 involved a more complex fruit ice task, requiring children to follow specific orders by placing a set number of colored dots, thereby integrating cognitive counting with motor precision. The final phase, Day 4, challenged the children with the Moon and Star patterns, requiring curved strokes and filling small, angular shapes.

Data analysis followed a qualitative thematic approach, involving data reduction, data display, and conclusion drawing (Braun & Clarke, 2022.) The observation and interview transcripts were coded to identify patterns in finger usage and muscle control. For instance, dotting movements were analyzed for precision and pressure, while interview responses were categorized based on the children's comfort and efficiency. This rigorous analysis ensured that the findings were grounded in the empirical evidence gathered from the children's authentic interactions with the artistic media.

Results and Discussion

The results of this case study indicate that finger painting serves as a multi dimensional stimulant for fine motor development, affecting muscle strength, coordination, and tactile precision. According to (Febriyanti, 2025), finger painting provides a rich sensory experience that strengthens that helps finger muscles. Over the course of four days, participants demonstrated a significant ability to adapt their physical movements to the specific demands of each artistic task. The following table summarizes the key developmental indicators observed across the primary subjects.

Table 1. Summary of Fine Motor Development Indicators

Participant	Primary Finger Technique	Observed Muscle Strength	Coordination & Precision	Subjective Experience
Gta	Thumb	Robust and stable	High precision in micro-details	Perceived efficiency and accelerated task completion
Tma	Index finger	Strong, yet susceptible to fatigue	Flexible and accurate placement	Strategic pacing; utilizes observation as a rest mechanism
Zbr	Index finger	Highly forceful and energetic	Precise dotting within defined boundaries	Highly engaging and rapid execution
Syf	Thumb	Consistent and robust	Excellent area-specific target placement	Positive affect and high intrinsic motivation



Jl	Index finger	Strong and well-controlled	High precision with effective boundary control	Methodical approach and high meticulousness
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Analysis of Fine Motor Performance

The qualitative data reveals a distinct correlation between the child's choice of finger and the efficiency of the task. On Day 1, during the prayer mats painting task, children began establishing their preferred tools. Participants like Gta and Syf opted for the thumb, noting that it felt more natural for filling spaces quickly. Observations confirmed that their movements were stable and fluid, showing no signs of stiffness. This choice of the thumb represents a high level of proximal stability, allowing them to apply consistent pressure without early-onset fatigue. In contrast, Tma, Zbr, and Jl favored the index finger, particularly for the dotting technique. While the index finger offers superior distal mobility for fine details, it also appeared more taxing for some. Tma specifically mentioned feeling a little tired, requiring short breaks to observe his peers before continuing. This fatigue is a natural part of motor skill acquisition, where the small muscles of the hand are being conditioned through repetitive use (Ghafari, 2026). By Day 2, during the creation of date shapes, these children showed improved control, taking just enough paint to maintain the aesthetic quality of their work.

These findings strongly support existing foundational theories of early childhood motor development, particularly the proximodistal trend, which posits that motor control matures from the center of the body outward to the extremities. The transition toward utilizing the index finger for complex dotting highlights the progression from gross structural stability to refined distal dexterity (Utami, 2025). However, a key theoretical contribution and novelty offered by these observed adaptation patterns lies in the rejection of motor mastery as a purely physical, linear process. Instead, this study demonstrates that young learners actively employ "ergonomic self-regulation." When faced with localized muscular fatigue, children do not simply disengage; rather, they dynamically switch to structurally more stable fingers (like the thumb) or utilize social modelling such as Tma's strategy of observational resting to cognitively sustain their physical motor practice. This uncovers a novel interplay between social learning and neuromotor adaptation, suggesting that sensory-rich, semi-structured art mediums create a resilient, self-paced environment for motor conditioning that rigid pencil and paper drills fail to accommodate.

The Fruit Ice task on Day 3 served as a critical test of hand-eye coordination. Children were required to place specific colors (red for strawberry, yellow for pineapple, blue for avocado) in targeted areas. The documentation highlights that all subjects could accurately place these dots within the glass outline, demonstrating refined spatial awareness. Jl's performance was particularly noteworthy; he intentionally took minimal paint to ensure that no pigment stained the surrounding table, showcasing advanced self regulation and physical inhibition.

On Day 4, the complexity increased with the Moon and Star patterns. This task required the children to combine dotting with slight sweeping motions to fill the crescent shape. Results showed that the children maintained high focus, even when dealing with smaller, angular details like the stars. The final artifacts demonstrate a clear progression in movement variation, where children used the tips of their fingers to navigate corners while using the pads of their fingers for larger surface areas (Faradillah & Tahir, 2022).

Subjective interviews provided insight into the psychological factors driving motor performance. Children who reported feeling happy or liking the activity showed higher levels



of and focus. Zbr, for instance, reported no fatigue specifically because he enjoyed the process, suggesting that emotional engagement can mitigate the physical strain of fine motor tasks. This aligns with the observational notes that described him as very enthusiastic while maintaining strong muscle pressure.

The findings suggest that the finger painting intervention effectively stimulated fine motor skills across all five indicators (Safitri & Agusniatih, 2025). The children transitioned from basic tactile exploration to purposeful, precise movements (Usia, 2022). The high level of precision observed in the final tasks (Day 4) indicates that repetitive, thematic engagement with finger painting builds the foundational hand strength and coordination necessary for more advanced academic tasks such as handwriting and complex drawing.

Theoretical Framework and Motor Mastery

According Utami (2025) neuro motor development, fine motor skills are refined through the repetitive activation of small muscle groups in the hands and fingers. This study's finding that children deliberately choose specific fingers for different tasks aligns with the principle of motor efficiency. Gta and Syf's preference for the thumb reflects an instinctive search for stability, as the thumb provides the strongest base for pressure. Conversely, the use of the index finger by Tma, Zbr, and Jl for dotting indicates a progression toward distal dexterity. This shift from using the whole hand to isolated finger movements is a hallmark of advanced fine motor maturation in the 4-5 year age group (Aquarisnawati, 2011).

Recent studies by (Khusnaini., 2025) suggest that tactile stimulation through wet media like paint enhances the neural pathways responsible for hand eye coordination. This is evident in the Day 3 Fruit Ice task, where children had to count and place dots precisely. The integration of cognitive tasks (counting) with motor execution (painting) creates a dual-task environment that accelerates developmental milestones. As noted in the observation of Jl, the ability to control paint volume to keep the workspace clean indicates not just motor skill, but an emerging sense of executive function and inhibitory control (Tabun., 2024).

Analysis of Behavioral Indicators

The Dancing on Paper intervention highlighted five critical indicators of motor progress. The following table provides an analytical breakdown of these indicators based on the observed data and theoretical implications.

Table 2. Discussion Analysis of Fine Motor Stimulation

Indicator	Empirical Observation	Analytical Interpretation	Relevant Link	Research
Finger Flexibility	No stiffness observed in Gta or Jl when dotting.	High flexibility suggests a well-developed range of motion in the phalangeal joints.	Aisy & Adzani, (2019) notes that flexibility is the precursor to cursive writing readiness.	
Eye-Hand Coordination	Precise placement within the sajadah and bulan outlines.	Indicates successful integration of visual input with motor output (visuomotor integration).	Wahyu (2023) emphasizes that painting boundaries improves spatial reasoning.	
Muscle Strength	Very strong pressure applied by Zbr and Syf.	Essential for developing the endurance needed for future academic writing tasks.	Andika et al (2022) links finger pressure to the development of the palmar arches.	

Movement Variation	Transition from simple dots to complex filling of shapes.	Demonstrates motor plasticity, where children adapt techniques to solve aesthetic problems.	Saddia (2025) argues that movement variety prevents repetitive strain in early learners.
Perseverance & Focus	High focus maintained during detailed star and moon tasks.	Tactile engagement increases flow state, leading to longer durations of skill practice.	Kumalasari (2024) finds that sensory art increases attention spans in preschoolers.



Figure 1. Finger Painting activity make prayer tools

The Role of Sensory Feedback and Fatigue

A significant finding in this study was the role of physical fatigue as a developmental signal. Tma's experience of fatigue on Day 2 is a critical data point. Unlike structured writing drills which might cause a child to disengage upon feeling tired, the creative nature of finger painting allowed Tma to utilize a social rest strategy observing peers before re engaging. Research (Henawati et al., 2025) finger painting provides a self regulating environment where children can push their physical limits while maintaining interest .

Furthermore, the dotting technique preferred by the majority of participants serves as a form of "proprioceptive input." By feeling the resistance of the paper and the texture of the paint, children receive immediate feedback on the force they are applying. This feedback is crucial for children like Zbr, whose high energy was channeled into precise, strong-pressure dots. Research by (Andriani et al., 2025) confirms that children who engage in high-sensory motor activities show 20% more accuracy in pencil-grip tasks compared to those who do not.

Synthesis of Findings: "Dancing on Paper"

The metaphor of dancing correctly describes the rhythmic, fluid movements observed during the four-day intervention. The progression from the prayer mats to the *dates* and finally the *bulan* shows a clear trajectory of skill acquisition. By Day 4, the children were no longer just making a mess; they were navigating complex geometric boundaries with their fingertips. Research (Loka, 2026) This transition from gross finger movements to fine precision movements validates that finger painting is an effective intervention for motor stimulation.

The integration of local cultural themes (dates, prayer mats, fruit ice) also played a role in the perseverance of the children. When children are familiar with the objects they are painting, their cognitive load is reduced, allowing them to focus more intensely on the motor mechanics of the task. This suggests that the Dancing on Paper model is not only physically



beneficial but also culturally responsive and psychologically engaging. These findings offer significant conceptual implications for early childhood developmental theories, as they redefine fine motor acquisition not as an isolated mechanical process of muscle growth, but as a dynamic, situated interplay of sensory exploration, cognitive focus, and cultural familiarity (Maharani., 2024). By demonstrating that familiar cultural schema accelerate physical coordination, this study bridges Vygotskian sociocultural framework with contemporary neuro-motor research, proving that physical dexterity is deeply optimized when embedded in meaningful, lived experiences rather than abstract, repetitive drills. Furthermore, this study yields critical practical implications for early childhood pedagogical practices. For educators and curriculum designers, the "Dancing on Paper" framework serves as an empirical blueprint to reform traditional, rigid paper and pencil handwriting preparation. Instead of relying on monotonous tracing exercises that often trigger early school burnout, kindergartens can integrate structured, thematic finger painting into their daily schedules as a targeted developmental intervention. Practically, teachers can utilize the multi day progression model established in this research—moving from simple area filling to intricate, angular boundary control—to monitor, scaffold, and support individual children's intrinsic motor stamina and grip readiness in a joyful, self-regulated classroom environment.

Conclusion

This study confirms that the Dancing on Paper finger painting intervention significantly stimulates fine motor development in children aged 4-5. The results indicate that tactile-based artistic activities improve three core areas: muscular strength, dexterity, and visuomotor coordination. By transitioning from basic touch to complex thematic patterns (*dates, prayer mats, and moon-star patterns*), children demonstrated an increased ability to regulate finger pressure and spatial precision. The study also highlights that finger painting fosters psychological engagement, which sustains the physical effort required for motor mastery. Ultimately, finger painting serves as a bridge between creative play and the mechanical readiness necessary for future academic tasks like handwriting

Recommendation

For future research, it is recommended to expand the scope by employing a longitudinal approach to monitor the long-term sustainability of motor gains. Investigating whether the refined finger dexterity acquired through finger painting directly translates to improved writing readiness or instrument manipulation in later primary years would provide valuable data. For kindergarten teachers, it is highly recommended to transition from rigid, repetitive tracing worksheets to process oriented, sensory-rich activities like the "Dancing on Paper" framework as a primary tool for fine motor preparation. Teachers should systematically design multi day, themed artistic interventions that progressively challenge children's hand muscles moving from broad space filling to intricate boundary controls. For kindergarten leaders and principals, it is recommended to provide structural and policy support by integrating sensory based creative arts directly into the formal early childhood curriculum rather than treating it as a peripheral leisure activity. Leaders should allocate institutional budgets for high quality, non-toxic, and safe sensory media, while design school environments that accommodate tactile exploration. Furthermore, school leaders should facilitate professional development workshops and collaborative training sessions to equip educators with the pedagogical skills required to implement, assess, and monitor micro developmental motor progress through artistic mediums.



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