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Research Article

The Effect of Sensory Play Classes on Emotional Regulation in Children Aged 4 to 5 Years

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ABSTRACT

The purpose of this study was to determine whether or not there was an effect of sensory play classes on the emotional regulation of children aged 4–5 years. This study was a quantitative study with a quasi-experimental approach (quasi-experimental research) that aimed to determine the effect of sensory play classes on the emotional regulation of children aged 4–5 years. This study used a non-equivalent control group design, in which there were two groups, namely the experimental group (taking sensory play classes) and the control group (taking regular learning). The results of the study showed that based on the pretest and posttest data, as well as the statistical tests that had been carried out, it can be concluded that after the treatment in the form of sensory play classes was given to the experimental group for eight meetings, there was a significant increase in emotional regulation scores. The posttest results showed a fairly large difference in scores between the experimental group (average = 65.89) and the control group (average = 50.13), with significant t-test results ($p = 0.000 < 0.05$). The normality and homogeneity tests indicated that the data from both groups met the requirements of the parametric test, with normal data distribution and homogeneous variance. Thus, it can be concluded that sensory play classes have a significant influence on improving emotional regulation in children aged 4–5 years. Children become more able to recognize, control, and express their emotions in a more positive way after participating in sensory play sessions.

Keywords: Children's Emotions; Emotional Regulation; Play Class; Sensory

1. INTRODUCTION

Early childhood is a period of development (the golden age), spanning the ages of 0–6 years, characterized by rapid development in various aspects, including emotions (Rachmat et al., 2021; Suryana et al., 2022; Untung et al., 2023; Wulandari, 2021). At 4–5 years of age, children are in a crucial phase of learning to recognize, express, and manage their emotions appropriately. Emotional regulation is a fundamental skill that will have a long-term impact on a child's future social and academic well-being (Saputri, 2021). Early childhood, often called the "golden age," refers to the period from birth to around six years old, when children experience rapid growth in many areas, including emotional development. At the age of four to five, they are in a vital stage of learning how to recognize, express, and manage their emotions in healthy ways. The ability to regulate emotions at this stage lays a strong foundation for their future social relationships and academic success.

Emotional regulation refers to a child's ability to control their emotional reactions in various social situations. Children with adequate emotional regulation tend to be able to resolve conflicts, follow rules, and participate in learning activities more effectively. Conversely, children with poor emotional regulation skills are more prone to emotional outbursts, frustration, and social difficulties (Rahmawati, 2021). In the context of early childhood education, the development of emotional regulation skills can be facilitated through learning approaches that involve sensory experiences. Sensory play classes are one learning method that focuses on exploring children's senses, such as touch, smell, sight, hearing, and body movement (kinesthetic). This activity not only stimulates cognitive and motor development but also plays a crucial role in supporting children's emotional management (Febrianti & Pratiwi, 2022).

Studies show that meaningful sensory experiences can help children identify and calm themselves when experiencing intense emotions. For example, playing with kinetic sand, finger paints, or slimy materials can be a non-threatening form of self-expression and can reduce emotional tension (Wulandari & Aisyah, 2021). Children who participate in sensory play classes tend to have a better understanding of emotions and are able to regulate negative emotions more healthily. Furthermore, research by Handayani (2021) states that structured sensory play activities can increase emotional

awareness and empathy in early childhood. This aligns with findings by Lestari and Wahyuni (2022), which show that children's interactions with natural sensory media such as water, flour, and seeds can strengthen brain connections responsible for self-control and emotional calm.

KB. Nurul Qur'an Kindergarten, the location of this research, included 17 children aged 4–5 years who exhibited varying emotional regulation abilities. Based on the researchers' initial observations, some children demonstrated difficulty managing feelings of anger and disappointment when playing with friends and tended to exhibit tantrums when they didn't get what they wanted. This indicates a need for play-based interventions that can positively develop children's emotional capacities.

Several teachers at Nurul Qur'an Kindergarten also stated that exploratory and free-play learning approaches, such as sensory play classes, have not been consistently implemented. However, according to research by Nurhaliza (2021), implementing structured sensory play classes can strengthen children's social-emotional skills and increase their focus during the learning process. Furthermore, other literature also reveals that sensory experiences are closely linked to the limbic system, the part of the brain that processes emotions. Therefore, through play activities that stimulate the sensory system, children can develop internal strategies for calming themselves, understanding their own and others' emotions, and developing conflict resolution skills (Putri & Widodo, 2020).

The importance of sensory-based learning in developing emotional regulation is also supported by Jean Piaget's developmental theory, which states that early childhood is in the pre-operational stage, where concrete, experiential learning is the most effective way to absorb and understand the world around them. Through sensory activities, children not only learn about the physical environment but also develop an understanding of emotions and their social roles (Kartika & Yuliani, 2023). Sensory play classes also facilitate the development of children's executive functions, such as impulse control and cognitive flexibility. As explained by Fauziah and Rahayu (2023), children who engage in sensory play activities show increased resilience to stress and better self-control when faced with situations that trigger negative emotions.

This research, supported by Maharani (2022), shows that outdoor play activities improve children's social skills but does not explicitly examine the aspect of emotional regulation. Research by Nuraini and Syafitri (2021) discusses the importance of multisensory stimulation in early childhood education (ECE) but places greater emphasis on cognitive development. A study by Pramudita & Latifah (2021) also found that exploratory play can reduce children's aggressive behavior but did not use a specific instrument to measure emotional regulation. Meanwhile, several other studies, such as that by Rosdiana & Meilani (2023), address the emotional aspect of contextual learning but have not explored the influence of sensory play in depth. Previous research has also examined the relationship between play activities and children's emotional development. However, most of these studies focused on free play or imaginative play, rather than specifically designed sensory play activities.

Most studies still view play as a general activity without specializing in structured and systematic sensory play activities. Research on the influence of sensory play classes on early childhood emotional regulation is still limited to schools in large cities, with little attention to local school contexts such as KB. Nurul Qur'an. However, in practice, the implementation of sensory play classes as a learning strategy to support emotional regulation has not been studied in depth in Indonesia, especially as will be conducted by researchers in the study at KB. Nurul Qur'an. Although various studies have proven its benefits, most still focus on aspects of cognitive and motor development, not on emotional regulation specifically (Anjani & Kusumawati, 2020). Based on this description, the focus of the research is not only on the implementation of sensory play classes but also on measurable changes in children's emotional regulation. Thus, this research is expected to provide a practical contribution to early childhood education and expand theoretical understanding of the importance of sensory-based learning.

2. RESEARCH METHOD

This study is a quantitative study using a quasi-experimental approach. It aims to determine the effect of sensory play classes on the emotional regulation of children aged 4–5 years. This study used a non-equivalent control group design, with two groups: the experimental group (participating in sensory play classes) and the control group (participating in regular learning). The research design used was a non-equivalent control group design with the following structure:

Table 1. Research Design

Group	Pre-Test	Treatment	Post-Test
Experimental	O_1	Sensory Play Class	O_2
Control	O_1	Regular Learning	O_2

Description:
O_1 : Emotional regulation baseline test
O_2 : Emotional regulation post-test

In the experimental group, children were given a sensory play class for four weeks (eight sessions), while the control group continued with regular learning according to the daily curriculum. The population in this study was all 17 children aged 4–5 years registered at the Nurul Qur'an Kindergarten (KB Nurul Qur'an) in the even semester of the 2024/2025 academic year. The sample was selected using a purposive sampling technique based on the following criteria: children were between 4–5 years old, had no physical or cognitive developmental disabilities, and had parental consent to participate in the sensory play class. The sample was then divided into two groups: 9 children in the experimental group and 8 in the control group.

Data collection techniques used in this study included: 1) Observation, used to assess children's emotional regulation skills before and after treatment. Observations were conducted using an emotional regulation observation sheet developed from Denham's (2011) emotional regulation indicators, which include: a) the ability to recognize one's own and others' emotions, b) the ability to calm oneself, c) the ability to express emotions appropriately, and d) the ability to solve social problems. 2) Documentation, used to support observational data such as activity photos, child attendance, and teacher diaries related to children's emotional expressions and behaviors during the study. 3) Semi-structured interviews (optional as supporting data) were conducted with class teachers and parents to obtain an overview of changes in children's emotional behavior at home and at school. Data analysis in this study was conducted through several stages: 1) Prerequisite Analysis Tests: a) Normality Test to determine whether the data are normally distributed, b) Homogeneity Test to determine whether the variances between groups are equal. 2) Hypothesis Testing: Using a two-sample independent t-test to determine differences in emotional regulation scores between the experimental and control groups after treatment. If the data are not normally distributed, the Mann-Whitney U test is used as a non-parametric alternative. 3) Descriptive Analysis, used to describe the pre-test and post-test results quantitatively in the form of tables, graphs, and percentage changes.

3. RESULTS AND DISCUSSION

3.1 Results

This study involved 17 children aged 4 to 5 years enrolled at the Nurul Qur'an Kindergarten (KB Nurul Qur'an) in the even semester of the 2024/2025 academic year. They were divided into two groups: an experimental group of 9 children who participated in sensory play classes and a control group of 8 children who participated in regular learning. Each child's emotional regulation skills were assessed using observation sheets before (pre-test) and after (post-test) the treatment. Prior to the intervention, a pre-test was administered to assess the children's initial emotional regulation skills. The results are presented in **Table 1**.

Table 2. Emotion Regulation Skills Pre-Test Results

Group	Number of Children	Mean Score	Standard Deviation
Experimental	9	45,67	4,12
Control	8	46,25	3,98

Table 2 shows that the average initial emotional regulation scores for both groups were nearly identical, at 45.67 for the experimental group and 46.25 for the control group. Meanwhile, a t-test showed no significant difference between the two groups at the pre-test stage ($p > 0.05$), thus concluding that the initial emotional regulation abilities of the children in both groups were comparable. The sensory play class, conducted over four weeks and consisting of eight sessions, significantly impacted the behavior and emotions of the children in the experimental group. This activity was designed to stimulate the children's five senses through various media and sensory play, such as kinetic sand, colored water, textured balls, slime, and flour dough. The children showed high interest from the first session, as evidenced by their enthusiasm in exploring the materials provided.

In the first and second sessions, the focus of the activity was on introducing sensory materials, such as kinetic sand and colored water. Most children appeared hesitant to touch unfamiliar materials, especially wet or sticky ones. However, after a few minutes of free play and teacher guidance, they became accustomed to the experience and began to explore more actively. This shows that new experiences can stimulate curiosity while teaching children about accepting discomfort (Agustini et al., 2024; Hunaepi et al., 2024). The third and fourth sessions showed increased participation. Children began to engage not only physically but also emotionally. When fighting over tools or play areas, some children initially displayed impulsive behaviors such as pulling or crying. However, the teacher helped the children express their desires verbally. With this approach, children began to learn to regulate their emotional impulses and communicate their needs more calmly.

Texture balls were used in the fifth session to train children's tactile perception. Children were asked to guess the ball's texture while closing their eyes, then describe how they felt when they touched the ball. This activity helped children connect physical sensations with their emotions. Some children reported feeling happy, ticklish, or calm. This exercise gradually builds emotional self-awareness, as Lestari and Wahyuni (2022) suggest that multisensory experiences support

children's recognition of emotions. In the sixth and seventh sessions, the children demonstrated improved cooperation skills. They took turns using tools and began helping their peers without being asked. One concrete example is when playing with soap bubbles, where the children shared a ladle and played together without conflict. This situation reflects increased self-control and empathy, which are positive indicators of emotional regulation. The teacher noted that the frequency of tantrums and angry behavior began to decrease starting in the third week. Children who typically showed frustration when their desires were not met began to wait their turn or find alternatives. For example, when one child wanted to play with the slime a friend was using, she chose to make her own dough using the available ingredients. This change indicates improved coping skills or emotional control mechanisms.

The eighth session focused on collaborative activities, creating a work of art together using watercolors and colored sand. The children worked in small groups, discussing colors and shapes, and then helping each other complete the drawing. This activity encouraged communication between children, shared decision-making, and increased self-confidence and self-esteem. This type of social interaction also helps children recognize and manage their feelings in a group context. Overall, each sensory play session had a gradual but noticeable impact on children's emotional regulation skills. The most visible improvement was the children's increased ability to express emotions verbally, control anger, and resolve conflicts in healthier ways. This aligns with research by Rosiyanah, Yufiarti, & Meilani (2020), which states that sensory play activities play a role in developing more adaptive emotional responses in early childhood.

Teacher observations also showed that children were calmer and more focused after the sensory play session. Some children who were initially anxious or easily bored in class became more controlled and able to follow the next activity well. This means that the sensory play class not only impacted emotional aspects but also increased overall learning readiness, as Ulfah (2023) stated that enjoyable sensory experiences support children's learning readiness. Following the intervention, a post-test was administered to assess changes in emotional regulation skills. The results are presented in Table 2 below:

Table 3. Post-Test Results for Emotional Regulation Skills

Group	Number of Children	Mean Score	Standard Deviation
Experimental	9	65,89	3,75
Control	8	50,13	4,10

Table 3 shows that the average emotional regulation score in the experimental group increased significantly from 45.67 to 65.89. Meanwhile, the control group showed a smaller increase, from 46.25 to 50.13. This is evident from the independent t-test, which showed a significant difference between the experimental and control groups at post-test ($p < 0.05$), indicating that the sensory play class had a positive impact on children's emotional regulation. To assess the effectiveness of the treatment, the average increase in emotional regulation scores from pre-test to post-test for each group was calculated:

Table 4. Increase in Emotion Regulation Scores

Group	Average Pre-Test Score	Average Post-Test Score	Score Improvement
Experimental	45,67	65,89	20,22
Control	46,25	50,13	3,88

Interpretation shows that the experimental group experienced an average score increase of 20.22 points, indicating that the sensory play class was effective in improving children's emotional regulation. Meanwhile, the control group only experienced an average score increase of 3.88 points, which could be due to natural developmental factors or regular learning. However, before conducting the hypothesis testing, normality and homogeneity tests were conducted to ensure that the data met the assumptions of parametric analysis. The results of the normality and homogeneity tests are presented in Tables 4 and 5 below. The normality test was conducted to determine whether the data from the experimental and control groups were normally distributed. This test used the Shapiro-Wilk test, as the sample size was less than 50.

Table 5. Normality Test

Group	Sig. (Shapiro-Wilk)	Description
Experimental	0,234	Normal Data
Control	0,172	Normal Data

Interpretation: Since the significance value (Sig.) for both groups is greater than 0.05, it can be concluded that the data is normally distributed. This fulfills one of the requirements for conducting the next parametric test (t-test). Next, a homogeneity test will be conducted to determine whether the variances of the two groups are homogeneous (equal). This test uses Levene's Test.

Table 6. Homogeneity Test

Group	F	Sig. (Levene's Test)	Description
Experimental & control	0,427	0,523	Homogeneous

Interpretation: Since the significance value (Sig.) is greater than 0.05, it can be concluded that the data have homogeneous variance. This means that both groups have equal data variability, and the requirements for the t-test are met. The t-test was used to determine whether there is a significant difference between the experimental and control groups in emotional regulation in children aged 4–5 years.

Table 7. T-test (Independent Sample T-Test)

Group	t	df	Sig. (2-tailed)	Description
Experimental & control	7,755	15	0,000	Significant

Since the p-value = 0.000 < 0.05, there is a significant difference between the experimental and control groups after treatment. The experimental group that participated in the sensory play class showed a higher increase in emotional regulation skills compared to the control group.

3.2 Discussion

Emotional regulation is an external and internal process within a child responsible for monitoring, evaluating, and modifying emotional reactions to achieve desired goals (Khotimah, 2024). The study showed a significant improvement in the emotional regulation abilities of 4–5-year-old children after participating in sensory play classes. The average score of the experimental group increased from 45.67 to 65.89, while the control group experienced only a small increase, from 46.25 to 50.13. This indicates that sensory play activities significantly contribute to the emotional development of early childhood. Sensory play classes provide stimulation through activities involving the five senses, such as playing with kinetic sand, colored water, textured materials, and movement-based games (Abidin et al., 2021; Giler et al., 2019). This stimulation supports the activation of brain areas related to emotional processing, particularly the limbic system. According to Putri and Widodo (2020), sensory activities stimulate neuronal connections that support children's self-control and emotional stability. The improvement in emotional regulation in the experimental group aligns with the theory of emotional development, which states that early childhood learns to regulate its emotions through interactive experiences, particularly those of a physical and concrete nature. According to Renna et al. (2020), emotional regulation assesses a child's adaptive process in regulating their emotions, such as assessing emotional expression and emotional self-awareness. Sensory activities enable children to recognize emotions in the context of play and learn how to cope with emotional discomfort through safe and enjoyable responses. This research also supports the findings of Febrianti and Pratiwi (2022), who showed that children who regularly engage in sensory activities demonstrate better emotional control and social interaction skills. Sensory play classes help children channel negative emotions constructively, for example, by kneading dough or splashing water during play.

Observations during the study showed that children who previously frequently threw tantrums or became easily angered, after several sensory play sessions, began to show behavioral changes such as calming themselves independently, seeking teacher assistance, and being able to verbally express their feelings. This aligns with the findings of Handayani (2021), who stated that interactions with sensory materials help children improve their emotional awareness and self-calming strategies. One crucial aspect of the success of sensory play classes in improving emotional regulation is their non-judgmental nature and the space they provide for exploration. Children don't feel pressured or restricted, allowing them to express their emotions safely. According to Lestari and Wahyuni (2022), a fun and stress-free learning environment provides optimal growth space for the development of social-emotional skills.

Unlike the control group, which underwent regular learning, children in the experimental group experienced active and varied play. In regular learning, repetitive and instructional activities tend to be less stimulating for children's affective development. Anjani and Kusumawati (2020) also found that learning activities limited to cognitive aspects are ineffective in developing emotional skills in early childhood. Sensory play activities also play a role in enhancing children's ability to understand others' feelings, also known as empathy. During play sessions, children learn to wait their turn, share tools, and respond to their peers' expressions. Nurhaliza (2021) emphasized that sensory-based activities also enhance empathy and cooperation because they involve direct social experiences.

In terms of planning, implementing a systematic and structured sensory play class yields more optimal results. A consistent schedule and a variety of materials used in each session help maintain children's engagement. This supports research by Fauziah and Rahayu (2023), which states that the success of an emotional development program is greatly influenced by the continuity and intensity of activities. Although research findings demonstrate the effectiveness of sensory play classes, several factors influence variation in improvement between individuals. Children with more physically active characteristics tend to show faster improvement. However, even children with quieter characteristics still show significant

improvements in emotional expression and control, as explained by Kartika and Yuliani (2023), who argue that the multisensory approach is inclusive and adaptive to various child types. From the teacher's perspective, this study demonstrates that teacher guidance and observation during play play play plays a crucial role. Teachers not only provide tools and materials but also act as facilitators, helping children recognize and reflect on their emotions. Rosdiana and Meilani (2023) emphasize the importance of teachers' presence as social-emotional guides in the context of early childhood learning.

4. CONCLUSION

Based on the results of the pretest and posttest data analysis, as well as the statistical tests conducted, it can be concluded that after eight sessions of sensory play classes were given to the experimental group, there was a significant increase in emotional regulation scores. The posttest results showed a significant difference in scores between the experimental group ($M = 65.89$) and the control group ($M = 50.13$), with a significant t-test result ($p = 0.000 < 0.05$). Normality and homogeneity tests showed that the data from both groups met the requirements for parametric testing, with normal distribution and homogeneous variance. Therefore, it can be concluded that sensory play classes have a significant impact on improving emotional regulation in children aged 4–5 years. Children became better able to recognize, control, and express their emotions in a more positive manner after participating in sensory play sessions. Based on the findings of this study, several recommendations can be made: 1) Kindergarten teachers, especially for children aged 4–5 years, are advised to incorporate sensory play activities into their daily learning routines, as they have been shown to be effective in developing children's emotional aspects. Institutions such as KB Nurul Qur'an and similar institutions should provide supporting facilities for sensory play, such as textured materials, natural media, or manipulative materials that are safe and engaging for children. Parents can be provided with simple education and training to assist their children in sensory play at home, thereby strengthening the development of children's ongoing emotional regulation. This research could be further expanded by increasing the sample size, extending the intervention period, or examining other variables, such as social and language development, that may be influenced by sensory activities.

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