



Color and Smell Sensory Play to Help Young Children Prepare to Try New Foods

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Abstrak

Penelitian ini bertujuan untuk mengkaji efektivitas pendekatan *color and smell sensory play* dalam membangun kesiapan emosional anak usia dini 3–6 tahun guna mengatasi penolakan terhadap makanan baru (*food neophobia*) di lingkungan keluarga. Penelitian ini menggunakan desain kualitatif dengan pendekatan studi kasus ganda (*multiple case study*) yang bersifat deskriptif-eksploratif. Subjek penelitian adalah 10 keluarga di Balikpapan, Pulau Kalimantan, yang memiliki anak usia 3 - 6 tahun dengan perilaku *picky eating*. Data dikumpulkan melalui observasi partisipan selama 4 - 6 sesi *sensory play* di rumah, wawancara mendalam semi-struktural sebelum dan sesudah intervensi dengan orang tua, dokumentasi, serta catatan harian responden. Analisis data dilakukan dengan teknik *thematic analysis* (Braun dan Clarke, 2006) yang dibantu oleh software NVivo. Hasil penelitian menunjukkan bahwa kombinasi stimulus warna cerah dan aroma alami secara signifikan meningkatkan kesiapan emosional anak, mengurangi respons ketakutan dan penolakan terhadap makanan baru hingga 80%, serta menjadikan waktu makan lebih tenang dan menyenangkan. Penelitian ini menyimpulkan pendekatan *color and smell sensory play* yang sederhana dan *family-centered* efektif diterapkan di rumah tangga serta berpotensi diintegrasikan dalam pendidikan Islam anak usia dini untuk membentuk sikap syukur dan kebiasaan makan sehat sesuai ajaran Islam. Pendekatan ini menawarkan solusi praktis dan holistik dalam pencegahan *stunting* di Indonesia.

Kata kunci: Kesiapan Emosional, Neofobia Makanan, Permainan Sensorik Aroma, Permainan Sensorik Warna.

Abstract

This study aims to examine the effectiveness of the *color and smell sensory play* approach in building emotional readiness of early childhood children aged 3–6 years in overcoming

the rejection of new foods (food neophobia) within the family environment. The research employed a qualitative design with a multiple case study approach that is descriptive and exploratory. The subjects of the study were 10 families in Balikpapan, Kalimantan Island, who have children aged 3–6 years exhibiting picky eating behavior. Data were collected through participant observation during 4–6 sensory play sessions at home, semi-structured in-depth interviews with parents before and after the intervention, documentation, and respondents' daily notes. Data analysis was conducted using Braun and Clarke's (2006) thematic analysis technique with the assistance of NVivo software. The findings showed that the combination of bright color stimuli and natural aromas significantly increased children's emotional readiness, reduced fear responses and rejection of new foods by up to 80%, and made mealtimes calmer and more enjoyable. This study concludes that the simple and family-centered color and smell sensory play approach is effective when implemented in the home environment and has strong potential to be integrated into Islamic early childhood education to cultivate gratitude and healthy eating habits in accordance with Islamic teachings. This approach offers a practical and holistic solution for stunting prevention in Indonesia.

Keywords: Color Sensory Play, Emotional Readiness, Food Neophobia, Smell Sensory Play

Introduction

The rejection of new types of food, known as food neophobia (Wallace et al., 2018), is a critical phenomenon that is becoming increasingly widespread among young children aged 3–6 years across various family settings in Indonesia. The prevalence of picky eating among children in this age group reaches 40–70%, with children tending to reject new foods and preferring only familiar foods such as white rice, fried foods, or instant noodles. (Nugrahedhi, Utomo, and Hantoro n.d.) In areas such as Balikpapan, on the island of Kalimantan, the previously high prevalence of stunting (Balikpapan City Government, 2024) still indicates risks stemming from a monotonous diet due to parents' busy schedules. This is of great academic importance because it is closely linked to children's sensory (particularly vision/color and smell/aroma), emotional, and cognitive development. In practical terms, this phenomenon has far-reaching effects on children's nutritional status, increasing the risk of stunting and vitamin and mineral deficiencies, and causing emotional tension in parent-child relationships during mealtimes (Daratulaila, 2025). Children are

becoming increasingly resistant to nutritious foods such as vegetables, fruits, or plant-based proteins that have different colors and aromas; therefore, sensory-play-based interventions at home are highly relevant and urgent to prevent long-term impacts on physical health, emotional development, and overall family well-being. In Indonesia, food neophobia is also correlated with low nutrient intake (Hardini & Wirjatmadi, 2024).

Previous research has extensively discussed various sensory interventions to address picky eating, such as sensory-based food education conducted in childcare centers (Kähkönen et al., 2018) and clinic-based sensory feeding interventions using the Sequential Oral Sensory approach (Kähkönen et al., 2018). In addition, several studies have also highlighted the role of olfactory exposure and visual cues in reducing food neophobia (Sorokowska et al., 2024). However, these studies still have some fundamental limitations: the majority were conducted in educational institutions or medical clinics, and thus do not adequately reflect the context of daily life within a family home environment. Previous research has not specifically and thoroughly examined the combination of color sensory play with smell sensory play as an integrated approach to building children's "emotional readiness" as a key mediator (Sorokowska et al., 2024). This gap creates a significant opportunity for more contextual and practical research in the home setting.

This study was designed to address these shortcomings by conducting an in-depth examination of the color and smell sensory play approach, which parents can directly implement in the home environment as a simple yet effective intervention. Specifically, this study explores how sensory play activities based on color (such as brightly colored foods or play materials) and scent (such as smelling fresh fruits or vegetables in a playful setting) can help build emotional readiness in young children. This process begins with the initial avoidance stage and progresses toward voluntary acceptance of new foods, thereby addressing food refusal in a holistic, sustainable manner without excessive pressure during mealtimes at home. This approach aligns with findings that sensory exploratory behaviors increase familiarity with and acceptance of new foods (Coulthard and Thakker, 2015). In Balikpapan, where parents' busy schedules often hinder mealtime interactions, this intervention offers a practical solution without the need for expensive facilities. The specific objective is to test the effectiveness of integrating color and smell as emotional mediators in reducing food neophobia among children aged 3–6 years in an Indonesian family setting (Sorokowska et al., 2024).

A color- and smell-based sensory play approach can positively and significantly foster emotional readiness in young children through the process of sensory desensitization and the creation of enjoyable and positive emotional experiences (Rahmawati et al., 2025). This emotional readiness then serves as a key mediating factor leading to a reduction in resistance to new food types within the family environment. This hypothesis will be tested using qualitative data in the form of participant observation and in-depth interviews with parents. It is based on evidence that visual cues (color) enhance the initial appeal of food (Carstairs et al., 2020), while olfactory exposure reduces negative arousal toward new aromas (Sorokowska et al., 2024). In Indonesia, where food neophobia correlates with low nutrient intake (Nugrahedi et al., 2024), the integration of these two stimuli is expected to serve as a strong emotional bridge. This study adopts a family-centered perspective to address the limitations of previous institutional studies.

Method

The primary unit of analysis in this study is the family unit, specifically young children aged 3–6 years and their parents or primary caregivers in a home setting. The study subjects were 10 families in Balikpapan, Kalimantan, who have children aged 3–6 years with picky eating behaviors. The study focused on the dynamic interactions between children and parents during sensory play activities. The family was chosen as the unit of analysis because interactions involving eating and sensory play most often occur at home, rather than in institutional settings. This approach aligns with studies that emphasize the importance of the family context in addressing children's eating issues (Jimenez-Arberas et al., 2024).

This study employs a qualitative design using a multiple case study approach that is both descriptive and exploratory. This design was chosen because it allows for an in-depth exploration of the process of developing emotional readiness through color and smell sensory play within the natural context of the family, with the possibility of incorporating simple quantitative elements such as behavioral observation scales before and after the intervention. The multiple case study is particularly well-suited for understanding complex phenomena such as sensory-based interventions for children with food neophobia in a home setting, as it allows for the comparison of patterns across cases while maintaining contextual depth (Højer et al., 2020).

Primary data was obtained directly from child and parent informants, from participants' observations during play sessions, and from documentation. Secondary data were drawn from parents' daily journals and the literature on sensory play and food neophobia. This combination of primary (observations and documentation) and secondary data is essential for capturing natural interactions and triangulating parental perspectives, as is common in qualitative research on children's eating behaviors and sensory sensitivity (Cunliffe et al., 2022).

Data collection was conducted through participant observation during 4–6 sessions of color and smell sensory play in each family's home, semi-structured in-depth interviews with parents before and after the intervention, as well as detailed documentation and field notes on children's emotional reactions and behaviors. This method was chosen because participant observation and semi-structured interviews effectively capture the dynamics of family interactions and changes in children's emotional behavior in a natural context, as is commonly used in studies of sensory intervention and picky eating (Notch and Simenson, 2014).

Data analysis was conducted using thematic analysis in a step-by-step process: transcription of all data, identification of main themes, review and refinement of themes, and in-depth interpretation. This process can be supported by qualitative analysis software such as NVivo to ensure the accuracy and depth of the findings. Thematic analysis is a flexible method and the most commonly used in qualitative research on sensory play, picky eating, and family experiences because it is capable of identifying thematic patterns in depth (Braun and Clarke, 2006). NVivo helps manage large datasets and enhances coding transparency.

The methods described above were designed to be ethical (with informant consent) and contextual, in line with the characteristics of family-based research in Indonesia. This approach addresses the gaps in previous studies, which were predominantly conducted in clinical or school settings.

Result and Discussion

1. Changes in Initial Emotional Responses to Color Stimuli (Color Sensory Play)

In the initial sessions (1–2), out of the 5 families observed in Balikpapan, 4 children exhibited a high fear response (scores of 4–5 on a 1–5 observation scale) in the

form of crying, moving away, or closing their eyes when they saw brightly colored foods (carrots, green spinach, red tomatoes, broccoli). The average duration of avoidance was 45–70 seconds. After 4–6 play sessions with food coloring or brightly colored toys, fear scores dropped to 1–2, with the duration of visual exploration increasing to >2 minutes. Interview excerpt: ‘At first, she immediately started crying and said, The color is weird, I’m afraid to eat it, but after playing with colorful food coloring and carrots, she now says, The colors are fun, just like toys.’ (Parent of Case 2, Balikpapan).

2. The Role of Scent in Building Familiarity and Reducing Negative Responses (*Smell Sensory Play*)

Observations during the sessions showed an increase in the duration of exposure to natural scents (orange, cinnamon, basil, lemon) from an average of <12 seconds (sessions 1–2) to 85–120 seconds (final session). Of the 5 children, 4 went from expressions of disgust or covering their noses to neutral or even happy expressions. Interview excerpt: “Before, whenever he smelled vegetables, he would immediately cover his nose and run away; now he actually comes closer on his own, sniffs the orange scent, and says, ‘It smells good, like fruit perfume’ (Parent of Case 4). Video recordings documented a decrease in the frequency of negative responses from 85% to 15%.

3. The Role of Emotional Readiness as a Mediator in the Acceptance of New Foods

After 4–6 integrated sessions, 4 out of 5 children showed voluntary acceptance (willingness to touch, smell, or taste) of at least 3 new food types (broccoli, carrots, berries). The frequency of refusal during meals decreased from an average of 78% to 22%, based on parents’ daily records. Quote: ‘Now he says on his own, It looks nice and smells good can I try it, Mom? when given broccoli; before, he would flat-out refuse it right away’ (Parent of Case 1).

This study found that the color and smell sensory play approach conducted at home effectively builds emotional readiness in young children in Balikpapan. Of the 10 families observed, the majority of children experienced a reduction in fear of the colors and smells of new foods, making them more willing to try nutritious foods. These results indicate that simple, sensory-play-based interventions can reduce food neophobia without excessive pressure during mealtimes.

Bright colors serve as visual cues that enhance initial appeal and evoke positive emotions, making children perceive the food as cute and safe, much like a toy (Tan et al., 2024). Food color plays a crucial role as a visual stimulus that influences the desire to taste and eat, as attractive colors can increase appetite (Arziyah, 2022). Meanwhile, exposure to natural aromas through smell-based sensory play builds familiarity and reduces negative responses through a process of desensitization and increased odor liking (Sorokowska et al., 2024). This is supported by research by Caroline et al. (2023), which concluded that adding the right aromas to food can increase children's appetite. The combination of both creates a pleasant sensory experience, making emotional readiness the primary mediator between sensory stimuli and food acceptance. This process is similar to sensory learning, in which children learn that new foods are not harmful.

The findings of this study align with those of Dazeley and Houston-Price (2015), who found that non-taste sensory play (visual and olfactory) in a nursery setting increased children's willingness to try fruits and vegetables. However, the novelty of this study lies in its implementation within the context of everyday family life in Indonesia, rather than in educational institutions or clinics as in the study by (Tan et al., 2024). This family-centered approach is easier for busy parents in urban cities like Balikpapan to replicate, without requiring special facilities. In the sociocultural context of Indonesia, particularly in Balikpapan, where the population is busy working in the industrial and mining sectors, family diets are often monotonous, and children are resistant to vegetables and fruits. This finding highlights the importance of early emotional education through simple games to address the risk of stunting caused by picky eating (Nugraheidi et al., 2024). Historically, lifestyle changes have shifted traditional mealtime interactions, making a family-based sensory approach relevant for strengthening parent-child bonds and fostering a sense of mutual cooperation in raising children.

The primary function of this approach is to improve children's nutritional intake and reduce emotional stress during mealtimes, thereby supporting holistic development. However, a potential drawback is the time constraints faced by busy parents. Although sessions last only 15–20 minutes, some respondents reported difficulty maintaining consistency when working overtime. Therefore, support from extended family or the posyandu community is essential to ensure the sustainability of the intervention.

From a scientific perspective, these findings offer a new contribution in the form of an integrated, family-centered color and smell sensory play model, while also enriching research on emotional mediators in addressing food neophobia within the Indonesian context. In educational practice particularly in early childhood Islamic education the results of this study open up opportunities for strong integration. Sensory play can be linked to Islamic values such as being grateful for the blessing of food (QS. Al-Baqarah: 172), educating children gently and without coercion (in accordance with the hadith of the Prophet Muhammad (peace be upon him) regarding compassion in education), and fostering holistic development that encompasses physical (nutrition), emotional, and spiritual aspects. This approach supports the concept of Islamic education that emphasizes the cultivation of noble character from an early age through activities that are enjoyable and in line with children's natural inclinations.

On the other hand, the findings of this study offer practical recommendations: parents can implement 4 to 6 sessions of color and smell sensory play each week at home using inexpensive materials such as fruits, vegetables, and food coloring. For early childhood education (PAUD) and community nutrition programs on the island of Kalimantan, this approach can be integrated into posyandu training and family curricula. From a policy perspective, local governments are advised to develop simple, sensory-play-based guidelines for stunting prevention that are more contextual and practical for urban family settings.

Conclusion

This study concluded that a simple color and smell based sensory play approach conducted in a family setting proved effective in building emotional readiness in young children (ages 3 to 6) to try new foods. Of the 10 families in Balikpapan who participated, the majority of children showed a significant reduction in food neophobia, with a consistent pattern of change: bright colors increased visual appeal, natural aromas fostered familiarity, and the combination of the two made emotional readiness the primary mediator, enabling children to be more willing to try and accept nutritious foods without pressure. These results demonstrate that play-based sensory interventions at home can address picky eating in a holistic, sustainable manner that aligns with the daily lives of families in Indonesia. Nevertheless, this study has limitations, including a small sample size (10 families) and an exploratory qualitative design. Therefore, further research is

recommended using a randomized controlled trial (RCT) design with a larger sample size, a longer duration, and quantitative measurements of children's nutritional status. In addition, future research should integrate color and smell sensory play into the Early Childhood Islamic Education curriculum to test its effectiveness in fostering an attitude of gratitude and sustainable halal-thayyib eating habits. Practical recommendations for parents and ECE educators include implementing 4 to 6 weekly sessions at home or in the classroom using simple materials, so that these activities become part of children's character education and holistic health in accordance with Islamic teachings.

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