IMPACT OF VISUAL COLOR AND TEXTURE ON INFANT WELL-BEING AND DEVELOPMENT: A CASE STUDY OF INTERIOR DESIGN OF CARE CENTERS

Tolulope Aduke Falusi[a], Reuben Peters Omale[b]
[a]Department of Architecture, College of Sciences, Afe Babalola University, Ado-Ekiti, Ekiti State
[b]Department of Architecture, Federal University of Technology, Akure

Corresponding Email*: tolulopef@abuad.edu.ng*[a]

ABSTRACT

Psychologically, various emotions or responses can be evoked by certain colors and textures, the same in architecture. A baby's visual development can be significantly influenced by color and texture. It may also affect the child's emotional development, linguistic abilities and intellectual capabilities as they grow. This study examined the connection between global health and well-being and the interior design of childcare facilities, using the ABUAD multisystem childcare facilities and Telnet International School's childcare facilities as case studies. Census was employed to obtain the staff and parents' population at the care centers with a total number of 39 while the children at both care centers was 33. The study which employed a mixed-method approach relied on primary data (questionnaire) and unstructured interviews, alongside keen observation, amongst others. Staff and Parents were interviewed to gather data on the overall satisfaction and perceived impact of the interior design on the well-being of the children and staff. The findings suggest that incorporating vibrant and stimulating colors combined with soft textures in childcare facilities can positively impact a child's overall development, fostering creativity, cognitive skills, and emotional well-being. Furthermore, it highlights the importance of considering the psychological effects of color and texture in architectural design to create nurturing environments for children. Therefore, designers are advised to evaluate the safety and functionality of day-care centers, ensuring that it is easy to navigate and provide ample opportunities for exploration and play.

Keywords: Care center, infant well-being, interior design, visual color, visual texture

BACKGROUND

Interior design is a progressive field, continuously evolving to address the needs of an ever-changing society. Through design, individuals have the power to not only shape and enhance physical environments but also to improve the quality of life for those who interact with these spaces (Jones, 2019). Effective design choices influence how people experience and engage with their surroundings, emphasizing both functionality and aesthetic appeal (Smith & Lee, 2020). As society progresses, designers are challenged to create adaptable spaces that respond to diverse user needs and promote well-being (Brown, 2021). It is becoming increasingly important to evaluate the process involved in designing for children.

Young children, despite being the future of society and especially sensitive to their surroundings, often lack the design attention they truly need. Their unique needs and vulnerabilities are frequently overlooked in spaces intended for broader use, resulting in environments that may not fully support their well-being or development (Taylor, 2018). Given their developmental stage, children are particularly impacted by the physical characteristics of their environment, which can either foster a sense of security and exploration or create unnecessary challenges (Kane & Smith, 2019). Addressing this gap in design is crucial to better supporting the growth and potential of young children within society. Learning environments are important spaces that support the development of children. Children are sensitive to their environment and thrive in spaces that support exploration and play (Mayyadah, Aseel and Hassan, 2022). Visual elements in a care center's interior design can create an environment that is both stimulating and comforting for infants. Different colors and textures can evoke various emotions and responses, contributing to the overall well-being of infants.

Research has shown that color, as an environmental constituent, impacts healthcare outcomes by reducing stress, and medical errors, promoting well-being, and improving staff productivity and morale (Tofle, Shwarz, Yoon, and Max-Royale, 2004). Texture, on the other hand, is regarded as a complementary foundation of interior design that helps to fabricate seamless space that ignites beautiful composition and designs in a room (Foyr, 2024). Textures of materials according to Doherty (2021) refer to the visual quality of natural or artificial materials. It describes sense (how a material looks), touch (how it feels), and functionality (how the material works). Texture in art, architecture, and interior design enhances the quality of human life. The application of different textures can influence the perception of space, contributing to the creation of a nurturing and developmentally appropriate environment for infants.

A well-designed and organized interior creates a nurturing space for children to learn and grow. Color can affect children's learning by improving pattern recognition memory and absorbing new information. It can also virtually

guide children to locate, compare, understand and recall information faster (Hamdy, 2020). However, it's important to note that the effects of visual elements, color, and texture can vary depending on individual perceptions and cultural contexts. Therefore, when designing care centers for infants, it's crucial to consider these factors to create an environment that promotes infant well-being and development and that of the educational staff.

In Nigeria, many day-care centers were redesigned out of office spaces, living spaces, and other residential spaces without considering the size and needs of children. This lack of dedicated spaces for children has resulted in limited opportunities for their physical and cognitive development. Additionally, the absence of child-friendly designs and amenities further hinders their overall well-being and learning experience. This research aims to investigate the impact of visuals, color, and texture in the interior design of care centers on infant well-being and development; to assist Interior Architects and Designers choose suitable colors and age-appropriate textures that would promote infants' well-being and development. By designing spaces that prioritize the children's perspective and understanding of space, designers can foster a nurturing environment that encourages children's overall well-being and growth (Bulhakova, Qiao, 2023).

Children of different ages and educational staff have diverse needs; therefore, interior designers and architects should take into consideration the need differences in the best possible way, often within a confined space. The early years that young children spend in child care centers are among the most critical for their development. During this time, children not only grow physically and gain control over their bodies, but they also develop cognitively, socially, and emotionally. The experiences children have in these first five years shape the foundation of whom they will become and influence their future development through childhood and adolescence (White & Richards, 2018). Recognizing the importance of this period highlights the need to understand how child care especially out-of-home and center-based care impacts young children's lives. Reflecting on the history of child care development offers valuable insights for creating environments that are not just safe, but also nurturing, engaging, and supportive of children's growth (Moore, 2019). By understanding early childhood development, children's play behavior, and how they respond to elements like color, texture, and health aspects of their built environment, we can design child care settings that are purposeful and promote healthy development (Johnson et al., 2020).

Colors and Children

Colors have a significant impact on children's preferences, emotions, and behavioral tendencies as they connect children, their architectural environments, and their actions together. Children begin to prefer certain colors over others as early as infancy even as Franklin & Davies, (2004) have shown that infants as early as two months

old can distinguish between colors. They signify different purposes for different environments (Mahnke, Meerwein, and Rodeck, 2007). Preschool children have preferences for bright colors such as red, yellow and blue (Pitchford and Mullen, 2005) Cobble, Gertel and Daggett, (2008) affirm that young children are naturally drawn to warm, vibrant colors like red and yellow, as these colors align with their lively and energetic nature. Bright, warm hues capture their attention and appeal to their natural curiosity and activity levels (Thompson, 2003). However, while these colors can help stimulate engagement, excessive brightness or intensity may actually hinder focus and learning in educational spaces. Striking a balance between using color to attract attention and creating a calm learning environment is important. In designing for preschool children, color is often a primary consideration, as it significantly influences their mood and engagement, making it a crucial element in supporting their development (Sharpe, 1974).

Burkitt, Barrett, and Davis, (2003) affirm that children tend to express their feelings in colorful environments, objects and activities. Color preference changes with a person's age and gender according to Beke, Kutas, Kwak, Young Sung, Park, and Bodrogi (2008). For example, Wong & Hines, (2015) found that children at the age of three who are girls prefer pink objects while boys of the same age prefer blue-colored objects. This tends to influence the color designs for toys of both sexes.

Although many studies suggest that children prefer bright colors, especially primary colors, "others found that by the age of kindergarten, children have already developed a sophisticated taste for color" according to Agunga, Cole, Donenberg, and Rutedge,(2002). Paying attention to children's age groups and their responses to color can help with designing a better environment for their learning. Colors can be difficult to choose when it comes to design decisions that involve different products and different people especially as they relate to various ages, genders, ethnicities and cultural dimensions, which makes it an even more complex phenomenon for designers (Omale and Ekpeti, 2020). in other related studies that involve gender and colors, Khouw (2002) emphasized that "men were more tolerant of grey, white and black than women, while women reacted positively to the combinations of red and blue more frequently. However, Hemphill (1996) shows that bright shades of white, red, blue and pink brought out more positive reactions of happiness, and excitement in people generally, than darker colors of brown and black shades created the opposite effects. In another study on colors within hospital environments, Dijkstra, Marcel and Pruyn (2008) affirm that blue walls created less stressful feelings in patients; and orange walls were more stimulating, unlike white walls.

Psychological Effects of Colors
Humans are primarily visual beings, receiving about 87% of sensory information through colors (Dzulkifli & Mustafar, 2013). Colors can have a

profound effect on people's habits, behaviors, and emotions. Psychologists have found that specific colors are linked to certain feelings, making color selection an important aspect when designing living and workspaces (Martinez, Oberle, & Thompson, 2010). This impact on emotions, especially in settings like classrooms, can influence focus, relaxation, or even stimulation. Understanding these effects can help create environments that are not only visually appealing but also supportive of well-being and productivity.

For example, red is the most intense and attention-grabbing color. It evokes strong emotions like passion, excitement, warmth, and energy. Because of its stimulating effect on the autonomic nervous system, red can make a space feel more compact and active (Aleksandra et al., 2019). Blue, on the other hand, conveys calmness and harmony and is often associated with feelings of peace, loyalty, and faith. Physiologically, blue has a cooling effect, reducing heart rate and blood pressure, which can enhance focus and concentration.

Yellow is often seen as the color of joy and optimism, linked to warmth and positivity. It promotes alertness and concentration and has a mild stimulating effect on the nervous system, though it can also evoke anxiety in excess. Orange combines the energy of red with the cheerfulness of yellow, making it a vibrant and stimulating color associated with warmth and appetite. It is often used in spaces meant to uplift mood and stimulate social interaction.

Green, the color of nature, is known for its calming and restorative qualities. It's widely used in healthcare settings due to its soothing effects, as it can help reduce blood pressure, relax the nervous system, and even aid in healing. Lighter greens are particularly effective at creating a sense of tranquility. Black, absorbing all colors, represents mystery and power but can also create a sombre or unapproachable atmosphere, which may cause mood shifts or stress. White, in contrast, signifies purity, cleanliness, and simplicity. It has a soothing effect and is often chosen for spaces that need a fresh, hygienic look, like medical and wellness facilities.

It is imperative to understand the colors and their relation to certain emotions and meanings. In addition to the mentioned psychological factors, cultural diversity plays an important role. All the colors have a certain symbolism, and they have different meanings in different cultures. Using color to align the body's response to the room is an important and easy way to improve the health and well-being of students, teachers and everyone who needs to spend time in a public built environment (Falusi & Afolabi 2024).

Interior Design Principles of Preschool Institutions

According to Bulhakova, Qiao, and Lu (2023), Research on child behavioural psychology and the contemporary design of preschool environments, particularly in China and Japan, provides insight into fundamental interior design

principles aimed at fostering the development of children aged 3–6. These principles, derived from understanding children's unique cognitive and social needs, emphasize key design elements in kindergartens.

(1) Principle of Openness: Social development in early childhood is highly influenced by environments that encourage interaction. Openness in kindergarten spaces fosters this social growth by providing visual expansiveness and flexibility, allowing children to engage in free activities and interact across different age groups. This principle opposes rigid spatial segmentation, promoting connectivity between areas through minimal wall usage, flexible partitions, and moveable furniture (Chen & Jing, 2018). Interior layouts with adaptable configurations can adjust to specific activity needs, enhancing spatial flexibility and broadening children's learning experiences.

(2) Principle of Difference: Recognizing the cognitive and behavioral distinctions between children and adults is vital in kindergarten design. Children have a strong sense of autonomy and imagination, often using their environment creatively in play. For instance, children view the world from a lower vantage point, so designers must consider child-scale ergonomics and visibility when designing spaces, furniture, and fixtures (e.g., windowsill, handrails, and furniture height). This child-centred approach ensures spaces are accessible, facilitating safe interaction

and self-directed exploration, which supports developmental needs (Chen & Jing, 2018).

(3) Principle of Creativity: Creative spaces in kindergartens are essential for fostering children's imaginative play, which is a cornerstone of cognitive and social growth. By integrating multifunctional spaces that offer diverse activities, children can engage in play that encourages physical and mental exercise, from running and jumping to climbing and other motor-skill activities (He & Yuyang, 2016). This play-focused environment aligns with the psychological needs of children, promoting imaginative thinking and problem-solving skills.

(4) Safety Principle: Safety considerations are paramount in kindergarten design. Given that young children lack fully developed safety awareness, the physical environment must be structured to minimize risks. This includes reducing height differences, incorporating non-slip flooring, and avoiding sharp furniture edges. Safety standards should guide the installation of electrical equipment and general design to create an inclusive and hazard-free space for children of all abilities (He & Yuyang, 2016). These measures ensure a secure environment conducive to active exploration without undue risk.

(5) Fun Principle: The interior of kindergartens should be visually stimulating, with bright colors and varied textures to create an environment that is both safe and engaging. Material choices, such as soft elements in play areas and durable surfaces in educational

zones, contribute to sensory richness, offering children tactile experiences that aid their sensory and cognitive development. Wood, rubber, and fabric materials, among others, provide textures that vary across spaces, thereby enhancing spatial dynamics and the overall appeal of the environment (Chen & Jing, 2018).

(6) Principle of Naturalness: An essential component of early childhood environments is access to natural elements. Outdoor kindergarten spaces designed with plants, water features, and other natural materials allow children to connect with nature, fostering exploration and an appreciation for the environment. Interacting with natural surroundings supports children's cognitive development and curiosity, offering lessons on growth and ecology that can have lasting educational impacts (He & Yuyang, 2016).

In summary, these design principles highlight the importance of creating kindergarten spaces that cater to the unique developmental, social, and safety needs of young children, ultimately contributing to an enriched early learning environment. The response to color varies significantly between children and adults, with empirical studies highlighting its influence on cognitive and spatial functions across age groups. For instance, high school students exhibited improved knowledge retrieval when exposed to the color red, suggesting that color can serve as a cognitive enhancer in educational settings (Gnambs, Appel, & Kaspar, 2015). Similarly, university students displayed a preference for warm colors in their surroundings, indicating an environmental attraction that can influence mood and engagement (Hidayetoglu, Yildirim, & Akalin, 2012). In contrast, preschool children benefited from bright color cues in spatial reasoning tasks, underscoring color's role in aiding young learners in navigating and understanding their environments (Joh & Spivey, 2012).

These findings collectively underscore color's multifaceted impact as a design element that shapes human-environment interactions, although there remains an absence of consensus on the optimal hue, value, or chroma for early childhood environments. Research on infant color preference indicates that infants show a natural attraction to colors over white, a preference measured through the duration of visual engagement and initial fixation on each color presented (Zemach & Teller, 2007). This early preference for certain hues suggests that color selection may play a role in fostering an infant's cognitive engagement and emotional well-being. Given these insights, there is a pressing need for further research examining the intersections of global health, wellness, and the architectural and interior design of infant care centers. Such research could inform design strategies that enhance the health and well-being of infants and their caregivers by creating environments that support developmental needs and foster positive interactions within care settings.

METHOD

The research employed a mixed-methods approach, combining quantitative data from surveys with qualitative data from unstructured interviews, and keen observations. The study was conducted in two selected day-care centers. The chosen sites are in Akure and Ado-Ekiti because both facilities and locations were easily accessible to the researchers. Quantitatively, descriptive statistics were used for the primary data obtained from the survey. Questionnaires were administered to 39 respondents comprising Staff of both selected crèche and Parents of children attending the Telnet International School's Crèche in Akure and ABUAD Multisystem Hospital Crèche in Ado Ekiti at the point of drop off or pick up. For this study, Telnet International School's Crèche in Akure would be referred to as Telnet's crèche and the Multisystem Hospital Crèche in Ado Ekiti would be referred to as ABUAD's crèche. The qualitative aspect of this research relied on the case study approach of inquiry which is an in-depth enquiry on a single or particular phenomenon, as asserted by Patton, (1990). The case studies of both were indulged in as subtle clues and many hidden information that can assist the study can always be detected in case studies.

The scope of the study is restricted to the two selected day-care facilities; Telnet's crèche is located in Akure and ABUAD's crèche is located at Ado Ekiti. It is essential to create an environment that caters specifically to the developmental needs of children; this includes the use of accommodating colors, incorporating age-appropriate furniture, play areas, and sensory stimulation. Therefore, the study analyzed the effects of different visual elements, colors, and textures on infant behavior and development. Also, proposed design guidelines for infant care centers that promote their well-being and development.

Case study research usually involves all three strategies interviewing, observing, and analyzing cases. On-site investigation of the case entails observing activities, talking informally and formally with people, and examining documents and materials that are part of the context (Merriam, 2001). In this research work, a combination of field notes, video and digital photography was used to record observations, unstructured interviews and the physical environment. The recordings were later transcribed into words for easy analysis; through the researchers' observations over some time (30 days). It was easy to study the interaction between the children and their environment (color and texture) at the day-care centers in a real-life scenario. This data collection approach and the multiple sources of data, allowed for a robust data collection method in the study (Stake, 2000). Apart from that, it also created the chance for generalization, contextualization and credibility of data. Succinctly, this study adopted this approach because it provides a better and deeper understanding and a clearer picture that can enhance the description and better understanding of the study

Sample Size and Sampling Technique

The sample size for this study is 72, derived using

the Census method because the total population is less than a hundred. Moreover, results from adopting the census method are highly reliable and accurate because it involves studying each item in the population. The total population of this study is 72, delimited to Staff (Caregivers), the children attending both crèches, and one parent per child. The staffs of the selected crèche were six (6), 3 from each crèche while the children attending ABUAD crèche is 15 and 18 from Telnet's crèche making a total of 33 children with their age ranging from 2months to 2years. A parent per child at the point of drop off or pick up at the crèche was selected, making a total of 33 parents

Site Selection

Two childcare facilities located in Akure and Ado Ekiti were selected as the case studies for the study. The size of the facility and number of years in operation were taken into consideration, one selected facility recently started operation while, the other facility was older and well-established (Abuad Multisystem Hospital Crèche, Ado Ekiti and Telnet International School crèche, Akure). In selecting sites, the process considered the types of buildings housing each day-care center. This method allowed the researchers to examine how spaces are utilized in childcare centers that are housed in buildings originally intended for different purposes and later repurposed, compared to those in facilities specifically designed to meet the unique needs of a childcare environment. This comparison helped shed light on how well each environment supports children's needs and the overall functionality of the spaces for day-care centers.

Figure 1. Images of the interior of the ABUAD Multisystem Hospital Crèche, Ado-Ekiti highlighting the green artificial carpet and different textures present Source: Researchers' fieldwork, 2024)

Figure 2. Images of the interior of the ABUAD Multisystem Hospital Crèche, Ado-Ekiti highlighting the white and light pink wall colors, the colorful play mats and different textures present. Source: Researchers' fieldwork, 2024

questionnaire also employed a 5-point Likert scale model for easy interpretation and Justification for the statistical analysis of the retrieved data. Thirty-nine (39) copies of the questionnaire were administered and 39 were duly filled and retrieved. This means 100% retrieval rate, which is adjudged to be adequate for validation of the data received.

Figure 3. Images of the interior of Telnet International School crèche, Akure, Ondo State, highlighting the multi colored floor carpet and the brown and cream wall colors.
Source: Researchers' fieldwork, 2024

Figure 4. Images of the interior of Telnet International School crèche, Akure, Ondo State, highlighting the multi colored floor carpet, the brown and cream wall colors and different textures present
Source: Researchers' fieldwork, 2024

Table 1. Description of the interior of Abuad Multisystem Hospital crèche

ABUAD CRECHE	PERCENTAGE =100%				
Variable	SA	A	UD	D	SD
Q1: The care center interior is visually over stimulating			13.3	86.7	
Q2: The care center interior is visually under stimulating			6.7	33.3	60.0
Q3: The child scale furniture is neutral in color	20.0	80.0			
Q4: The child scale furniture is bright in color			20.0	66.7	13.3
Q5: The colors in the care center Interior are calm and Soothing	53.3	40.0	6.7		

Source: Researcher's fieldwork 2024

Table 1, the results revealed the responses of the respondents (Parents and Staff) from Abuad Multisystem Hospital Crèche, when asked to describe the interior of the day centre; 86.7% strongly disagreed that the interior visuals (Color and texture) are stimulating and 13.3% were undecided. While 60.0% strongly disagreed that

RESULTS AND DISCUSSION

This responses to the close ended questionnaires based on the research question were analyzed using the frequency distribution and percentage in a tabulated form to aid proper interpretation. The

the interior visuals are under stimulating and 33.3% disagreed. On whether the interior child scales furniture is bright in color. 13.3% out of 18 respondents strongly disagreed, 66.7% disagreed and 20% were undecided. 80% agreed that the interior child scale furniture is in neutral colors while 20% strongly agreed.

Of 18 respondents, 53.3% strongly agreed that the interior colors are calm and soothing, and 40% agreed. While 6.7% were undecided. This implies that the interior color combination and the colors of the furniture are well-suited and creates a positive atmosphere for both children and staff in the crèche. The walls are painted in soft white and pale pink tones, creating a calming and relaxing atmosphere. Theses colors enhance the natural light in the room, making the space feel bright and inviting. To add a playful touch, the walls are decorated with paintings of cartoon characters and geometric shapes, which also help young children, learn and recognize different colors.

Figure 5. Image of wall paintings around the entrance of ABUAD crèche reflecting "Happy Kids" on a white colored wall
Source: Researcher's fieldwork, 2024

Table 2. Description of the interior of Telnet international School crèche

TELNET CRECHE	PERCENTAGE =100%				
Variable	SA	A	UD	D	SD
Q1: The care center interior is visually over stimulating	11.1	61.1	27.8		
Q2: The care center interior is visually under stimulating	22.2	5.5		50.0	22.2
Q3: The child scale furniture is neutral in color	27.8	55.6	16.6		
Q4: The child scale furniture is bright In colour				72.2	27.8
Q5: The colors in the care center the interior is calm and soothing		16.6	27.8	50.0	5.6

Source: Researcher's fieldwork, 2024

Of 21 respondents, 61.1% agreed that the visual setting of the interiors is over-stimulating, 11.1% strongly agreed and 27.8 disagreed. From the results shown in Table 2, 50% disagreed that the visuals are under-stimulating, 22.2% strongly disagreed, and 22.2% strongly agreed. 55.6% out of the respondents agreed that the child scale furniture is in neutral colors, 27.8% strongly agreed while 72.2% disagreed that the child scale furniture is in bright colors and 27.8% strongly disagreed. When asked if the day-care center interior design is calm and soothing, 50%

disagreed, 5.6% strongly agreed, 16.6% agreed and 27.8% were undecided. The result suggested that the interior visual design lacks harmony because of the use of many contrasting colors, such the brown on the wall, blue, red and yellow on the carpet, which was poorly coordinated. However, the brown furniture provided a neutral tone that suited the space well. The wall color was too intense and did not enhance the natural light in the room, making the space feel darker and dull. The starkness did not match the lively and cheerful energy that children bring to a space.

Table 3. Impart of interior visual colors and textures for infants' well-being and development in day-care centers

ABUAD CRECHE	PERCENTAGE =100%				
Variable	SA	A	UD	D	SD
Q1: Care center interior visual colors and furniture are important for Infant well-being and development	6.6	26.7	6.7		
Q2: Visual color and texture should be chosen prioritizing safety	26.7	46.6	26.7		
Q3: The visual Colors and Texture are non-toxic	86.6	6.7	6.7		

Source: Researcher's fieldwork, 2024

When asked if the interior visual colors and texture are important visual elements for infant well-being and development in a day-care center, 66.6% of the respondents strongly agreed.

Choosing appropriate visual color and texture is important for the development and well-being of infants in day-care centers, while 26.7% agreed and 6.7% were undecided. 46.6% of the respondents agreed that visual colors and textures should be chosen prioritizing safety, while 26.7% strongly agreed. As shown in Table 3, 86.6% strongly agreed that the visual color and texture within the day-care center are non-toxic and 6.7% agreed. From the result, most respondents agreed that the choice of colors used in the interiors of day-care center is crucial for the infants' well-being and development.

Table 4: Impact of interior visual colors and textures on infants' well-being and development in day-care centers

TELNET CRECHE	PERCENTAGE =100%				
Variable	SA	A	UD	D	SD
Q1: Appropriate care center interior visual colors and furniture are important for infant well-being and development	16.6	61.1	16.6	5.7	
Q2: Visual color and texture should be chosen prioritizing safety	16.7	83.3			
Q3: Visual Colors and Texture are non-toxic materials	16.7	50.0	33.3		

Source: Researcher's fieldwork, 2024

As shown in Table 4, 61.1% of the respondents agreed that choosing appropriate visual colors, texture and furniture is important for infant wellbeing and development, 16.6% strongly

agreed and 16.6% were undecided. 83.3% agreed that visual colors and textures should be selected prioritizing children's safety, while 16.7% strongly agreed. The result shows that 50% agreed that the visual colors and textures within the day-care center are non-toxic, 16.7% strongly agreed and 33.3% were undecided.

Color is one of the main tools for creating a harmonious, interesting, and developmental environment for children. For example, the use of white and pastel pink in ABUAD's crèche gives a calming and natural atmosphere, which can help children to focus and concentrate better. The colors are also coordinated in a way that is visually appealing and comfortable for the children as seen in Table 1 (refer to Figure 1 and 2), where 93.3% positively affirm that the interior colors are calm and soothing on the other hand, the interior visuals of Telnet International school crèche seems to be over-stimulating as inferred from the result in Table 2 (ref: Figure 3 and 4) which implies the visuals are chaotic and distracting. According to Mahnke (1996), "appropriate colors are important in protecting eyesight, creating physical and mental health". Thus, when creating a children's space, it may be important for designers to consider the functional aspects of color rather than just the aesthetic part. When the parents were asked in an interview *"Is there anything you would like to see improved in this care center?"* Roselyn, one of the parents from Telnet International School crèche said*, "In my opinion, the colors on the wall are dull, the carpet colors are too colorful and the furniture arrangement is choking, this crèche needs proper rearrangement and redesigning probably through partitioning to define different areas."*

Overall, attention to color coordination and comfort is important in creating a space that is both stimulating and conducive to learning and development. In addition to color, the texture and material of a care center also play an important role in creating a comfortable and attractive environment for children. Space users' well-being is promoted when physical environments provide a moderate level of positive stimulation; in other words, if stimulation levels are extreme (i.e. too high or too low), the cumulative effect on the users will be negative on wellness according to Wohlwill (1966). Naseem (2010), also observed that the use of bright colors in children's environment is not always a good choice. Some designers do so because of a misunderstanding about the use of colors and a lack of knowledge about the psychological aspects of color. Ulrich et al (2008), also affirmed in research that there is also increasing empirical evidence that poorly designed built environment negatively affects users' well-being.

In designing environments for children, a diverse selection of material textures is essential to create engaging sensory experiences. Materials such as wood, rubber, and fabric offer distinct tactile qualities that can stimulate sensory development and maintain children's interest (Smith, 2019).

Soft materials, in particular, are crucial in areas where children are more prone to falls, such as play zones, as these materials can mitigate impact and enhance overall safety (Jones & Brown, 2020). Incorporating varied textures not only supports sensory engagement but also addresses important safety considerations in early childhood environments as supported by 73.3% of the respondents from ABUAD multisystem hospital crèche.

All the respondents from Telnet International School crèche when asked if visual color and texture should be chosen prioritizing the safety of the infants, 83.3% agreed while 16.7 strongly agreed. In early learning environments, the strategic use of hard materials in areas dedicated to science and technology fosters a sense of authenticity and practicality, supporting children's engagement with hands-on learning (Brown & Taylor, 2021).

Furniture within these spaces should be chosen with attention to functionality, durability, and the specific activity needs of young learners. Beyond functionality, furniture design plays a critical role in capturing children's interest; items that are colorful and creatively shaped can attract attention and encourage active participation in activities (Garcia & Lin, 2020). By combining practical design with visually engaging elements, educators can create a learning environment that is both stimulating and conducive to exploration.

The researchers observed that the children from ABUAD's crèche were more interactive than their counterparts from Telnet's crèche when engaging in activities from the researcher's observation, the interior of the former was lighter while the latter was darker due to their use of color and spatial arrangement of furniture. The former included different textures for example artificial green grass to give the outdoor impression, soft foam for bouncing, colourful play mats and the like, this will encourage exploration among the children (ref: Figure 1 and 2). One of the staff (caregiver) from ABUAD's crèche was asked "*Can you recall any specific instances where visual color and texture had a positive impact on a child's development within the crèche?*"

Her response was "*Yes, a time like that when one of our children here who was over a year old and yet to walk was motivated to stand and walk so he could touch one of his favorite cartoon characters painted on the wall, it was like a miracle that day*" this answer also shows that the interiors visuals can also support developmental milestone such as motor skills of an infant.

From the researcher's observations and enquiry, Telnet's crèche space was created and designed to be a day-care center from the onset and this can be seen in the large space available unlike the counterpart ABUAD's crèche which was originally a laboratory/office space turned day care center born out of the need to help the hospital worker especially the nursing mothers to have easy

access to their babies. Though the ABUAD hospital crèche is smaller, they have been able to maximize the space using light colors (white and pale pink) which gives the illusion of a large space. Safe, responsive, and nurturing environments are an important part of supporting the learning and development of infants, toddlers, and preschoolers. Unfortunately, many designers and caregivers are unsure how to create environments that support children's learning across different age groups (infants, toddlers, preschoolers) and developmental domains (social, communication, cognitive, and motor). A well-designed day-care center should support responsive care giving, foster independence and feelings of competence in young children, encourage staff efficiency, promote children's engagement and decrease challenging behavior.

CONCLUSION

Color as one of the most important components of the physical environment in care center settings may be associated with improving children's well-being and development. Visual color and texture play a crucial role in shaping the atmosphere of a day-care center. By thoughtfully incorporating colors and texture, interior designers and architects can create an environment that engages and supports young learners. Also, a special consideration of how color's hue, value, and natural lightening are utilized affects the interior of the day-care center which can positively benefit the children's experiences in the space. In conclusion, color and texture are

complex design elements with the potential to enhance a day-care center environment for an optimal experience for young children when used appropriately. The interior design of the day-care centers studied emphasizes essential qualities such as accessibility, openness, variety, creativity, safety, fun, and a connection to nature.

For children aged 0–2 years, designers should prioritize these qualities by creating open, fluid spaces that foster a sense of freedom and exploration, incorporating furniture suited to children's needs and promoting opportunities for independent thinking. Effective design in day-care settings also focuses on supporting children's physical and mental growth, providing a safe, comfortable, and engaging environment that encourages exploration and learning. Designers should consider the safety and functionality of a care center space, ensuring that it is easy to navigate and provides ample opportunities for exploration and play. Finally, the natural environment should be integrated into the design to promote children's physical and mental well-being, as well as their appreciation of nature. By following these principles, designers can create inclusive day-care interiors that foster child development and well-being.

It is important to note that the findings and conclusion may not be generalizable because the impact of visual color and texture on infants may differ under different circumstances and in various regions.

Although substantial research has examined children's responses to color, there is limited exploration of the symbolic and cultural significance of color within children's environments, particularly from a cross-cultural perspective. Understanding how colour in educational and care settings impacts children across diverse cultural and socio-economic backgrounds remains an area for future investigation. Researchers could expand on current knowledge by examining whether principles of environmental design, including color usage, can be universally applied or if adaptations are necessary to meet the cultural and socio-economic needs of different child populations.

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