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Color Application in Children's Healthcare Environments

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Abstract

This research further examines the impact color has upon healing environments for children. For the purposes of this study, a selection of children's hospitals was analyzed through a series of case studies and site observations. The studies revealed a variety of color applications, some very successful and others less successful; these findings support a foundation for future design decisions in children's healthcare facilities. It should be further noted that the intention of this research is not to prove that the use of color in children's hospitals can impact healing. The goal of this research is to establish a set of principles for the successful application of color in the interior design of children's hospitals, while also examining why the integration of color is important to a child's healing environment.

Key words: *color, healing environments, children, healthcare facilities*

Introduction

The study of color in healthcare settings has gained particular interest and activity in the past few decades because of the popular media's and design community's insistence that color can affect mental, emotional, and physical states of patients and users (Bosch et al., 2012; Carroll, 2005). These organizations assert that color can shape moods and spatial perceptions, while also potentially improving health outcomes for old and young alike (Lechner et al., 2012; Tofle et al., 2004; Schwarz & Tofle, 2005). Several scholars, however, are concerned with the empirical rigor of studies on color effects in healthcare environments because there are many factors to be considered, such as the validity and reliability of measures and the differences in how colors are used for every study (Lechner et al., 2012; Tofle et al., 2004; Schwarz & Tofle, 2005), as well as confounding variables such as hues and brightness of color, lighting brightness and sources, age, gender, and culture of patients and users (Kwon, 2010; Park, 2009; Park & Park, 2013).

Literature Review

The review of literature shows that mostly, popular culture and the design community are the ones greatly promoting and believing in the effectiveness of using colors to affect human emotional, mental, and physical states or conditions (Bosch et al., 2012; Carroll, 2005). Scientific and empirical reviews of literature, on the other hand, agree that there is lack of conclusive evidence that can prove that color can influence emotional, mental, and physical states that can result to changes in healthcare outcomes (Lechner et al., 2012; Tofle et al., 2004; Schwarz & Tofle, 2005). Nevertheless, as Tofle et al. (2004) and Gray et al. (2012) showed, perceptional impressions of color can impact the experience and performance of workers in particular settings. At least for workers, if not for patients, color can affect their experiences and work conduct. In addition, if empirical studies showed anything, there are potential gender, cultural, and age differences in liking certain colors, but these color preferences are not linked to actual healthcare improvements (Kwon, 2010; Park, 2009; Park & Park, 2013).

Age in particular plays a significant role in how the patient responds to the application of color in the healthcare setting. In an article entitled, “The Application of Color in Healthcare Settings,” written by Sheila J. Bosch, Rosalyn Cama, Eve Edelstein, and Jain Malkin, the application of color in healthcare

design was explored through its relationship to a patient's age. It was determined in a study by Coad & Coad (2008) that, "design choices are reflections of their environments at home and/ or exposure to media such as television programs (the plethora of do-it-yourself and home improvement programs). Several participants referred to wanting the ability to control their environment, such as changing the color of walls and lighting." (Bosch, Cama, Edelstein, Malkin, 2012) It was also concluded that corridors should be painted in "warm, inviting colors" and that the corridors should be a single color. The most preferred colors for corridors were "warm blue, pastel green, pale or mid-yellow (not lemon) or mid-oranges." (Bosch et al., 2012) Overall, preferred colors were not bright, but were pale to midrange hues that were softer and subtler than the study had originally anticipated. This trend also holds true for adolescents. In a picture comparison study, conducted by Blumberg and Devlin (2006), only 26% of surveyed adolescents preferred an adult oriented hallway while 54% preferred the child-oriented hallway. This reveals that adolescents, along with children, show a preference for a colorful interior as opposed to the adult oriented hallway. (Bosch et al., 2012)

In an additional age related study, conducted by Perkins+Will, entitled, "Positive Distractions & Age Differences: Design Implications for Pediatric Healthcare Environments," authors Samira Pasha, Jamie Huffcut, and Tama

Duffy Day explore the "positive distraction techniques staff use for pediatric patients during medical visits, and the possible role of the built environment in supporting these techniques." (Pasha, Huffcut, Day, 2012) Their study revealed that medical staff used distraction techniques most of the time when interacting with patients younger than 2 years of age, and occasionally used them when interacting with patients aged 2-12, and rarely used them when interacting with patients aged 13-19. (Pasha et al., 2012) This indicates that environmental distractions might work most effectively when applied to settings where younger age groups are present as environmental distraction techniques are used less frequently as patient age increases. For ages 2-6, decorations and patterns were rated second most used distraction technique with its frequency of use decreasing as patient ages increase (Pasha et al., 2012). This result implies that wall decorations such as art, color and graphic applications can be best most successfully used as a distraction technique for specific age ranges, and these design elements should be applied more liberally in departments that cater to these age brackets. Further research should be conducted to explore a wide range of age groups.

Individual experiences can also shape color perceptions and effects (Kwon, 2010). Studies agreed that creating color guidelines in healthcare settings is invalid if they do not have scientific support (Tofle et al., 2004; Schwarz & Tofle,

2005). Finally, many of these studies agree that studying color in healthcare settings is difficult because context and meanings impact perceptions of colors and processes and outcomes of healing (Tofle et al., 2004; Schwarz & Tofle, 2005). Controlling and/or considering confounding or mediating factors are important in finding empirical connections between colors and emotional and mental states or behaviors and healthcare outcomes too (Kwon, 2010; Park, 2009; Park & Park, 2013). Hence, the future of color guidelines in healthcare settings is on shaky empirical grounds and future scientific studies are needed to further support its use.

Methods

Research methods used to conduct this study include 1) an analysis of case studies including Randall Children's Hospital in Portland, OR, Nemour's Children's Hospital in Orlando, FL, and Phoenix Children's Hospital in Phoenix, AZ, and 2) two site observations including C.S. Mott Children's and Von Voigtlander Women's Hospital in Ann Arbor, MI and Children's Hospital of Michigan (DMC) in Detroit, MI. The three case studies, along with C.S. Mott Children's and Von Voigtlander Women's Hospital, provide successful precedents for the application and integration of color within children's hospitals, while the Children's Hospital of Michigan (DMC) shows a less successful but

more typical application of color in healthcare design. These methods were used to analyze successful and unsuccessful trends of color application in children's healthcare design and were further used to explore how color might impact a more successful healing process. Again, it is the goal of this research to establish a set of principles for the successful application of color in the interior design of children's hospitals, so it was paramount that this study also included a typical example of a common hospital as well. Analyzing hospitals that represent a wide range of design quality provided the study with a comparison between successful applications of color usage and unsuccessful applications of color usage. Results are anticipated to reflect that young patients prefer to have color utilized in their immediate surroundings while going through the treatment and healing process. Patients, especially children, will prefer to be in a more stimulating, and possibly distracting, environment that encourages activity, resulting in a better health and motivation. These research methods will support a design guideline for color usage in future healing and healthcare environments.

Results

The results of the case study analysis were varied, yet informative. Many common themes were found among the three case studies of Randall Children's Hospital in Portland, OR, Nemour's Children's Hospital in Orlando, FL, and Phoenix Children's Hospital in Phoenix, AZ. These common themes can be expanded upon to successfully implement potential design strategies in future architectural projects of similar scope and style. Common themes found in each of these cases included 1.) the use of color as a distraction technique, 2.) the use of color as a means to evoke a more residential aesthetic in patient rooms, 3.) the use of color as a space defining element and wayfinding indicator. Other successful applications of color from the individual cases will be discussed ad hoc in more detail below.

Randall's Children's Hospital, designed by ZGF Architects, does a particularly successful application of color by employing it as a distraction technique. ZGF used various colors and materials to soften the space and create a more visually interesting environment. As stated by the architect, "The overarching goal was to create a place full of inspiration, with a sense of unexpected discovery and thoughtful distractions, in an environment that is comfortable for all ages." **(**"Randall Children´s Hospital," 2013**)** This technique

is highly noticeable in the patient rooms and corridors, where the use of wood floors, wood paneled ceilings, and bright furnishings become focal points as opposed to only being functional accents. (Figure A1). This serves many purposes, but overall it provides a welcomed contrast to the traditional all white and often hostile looking room that a patient typically finds in the hospital. Rooms that use color or a wide pallet of materials offer a variety of visual points that promote interest and draw the eye away from intimidating medical equipment. This visual aspect offers an added distraction for children who might otherwise be frightened by the imposing, complicated machines commonly found in patient rooms. In a 2012 study conducted by Perkins+Will entitled, Positive Distraction and Age Differences: Design Implications for Pediatric Healthcare Environments, healthcare professionals stated that they used distraction techniques "most of the time" for patients under 2 years of age with a decrease in use of distraction techniques as the patient's age increased. (Pasha, Huffcut, Day, 2012) This implies that use of color and materiality may be very useful as a distraction technique in very young patients, such as toddlers and infants.

Another successful application of color was commonly found in the patient rooms; color was used to evoke a more residential aesthetic, and therefore, a more calming and familiar environment where a child can feel more relaxed. As previous research supports, patients heal best in a calm and relaxed environment,

so design elements that suggest a more familiar space, such as a bedroom, might also support healing. Color can be used to achieve this goal. It is highly unlikely that the stark, all white rooms of hospitals past share many similarities with the homes of their current patients. HKS Architects' design for Phoenix Children's Hospital uses color and materials to help make patient rooms feel more similar to a child's bedroom.(figure A2) Not only do they apply color to the walls and flooring, but the room accessories, such as chairs and blankets, are also color coordinated to support the bedroom-like environment. In the case of Phoenix Children's Hospital, color is also used as an indicator of private areas vs. public areas. The lobby and public areas along the corridors use brighter and more saturated colors that evoke a more modern aesthetic. This is in contrast to the more muted colors used in the patient rooms. The color scheme is well coordinated, and becomes less prominent as one moves from public areas into private areas. This color gradient reinforces the residential environment of patient rooms, as the colors used there are noticeably subtler than those used in public areas.

Color is also commonly utilized as an element that defines public spaces and supports wayfinding techniques. Nemours Children's Hospital by Stanley Beaman and Sears and Phoenix Children's Hospital both successfully integrated the use of color as a design element that provides additional visual information.

(Figure A3). At Nemours Children's Hospital, "a combination of specialty finishes and high performance materials give the interiors a clean, modern aesthetic, and colorful furniture and wayfinding graphics punctuate spaces throughout." ("Nemours Children's," 2013) An exterior "honey-colored stone wall is also a wayfinding device, giving a hierarchy to the site and leading to and from main entries." ("Nemours Children's," 2013) In large-scale projects such as a hospital, it is helpful and often necessary to design multiple wayfinding techniques to accommodate the widest spectrum of visitors. At Phoenix Children's Hospital, "The planning of the campus is based on a north-south and east-west axis to preserve ease of navigating. It also includes markers that pave the way to different areas. This includes color palettes, wall murals and sculptures that guide the way to various facilities also adding an aesthetic and uplifting touch to the atmosphere." ("Nemours Children's," 2013) As stated, the application of color not only serves the primary function of the wayfinding elements but also the secondary function of aesthetic characteristic. Overall, the design of the interior is highly informative and represents the designer's successful integration of information with aesthetics.

The site visit to C.S. Mott Children's and Von Voigtlander Women's Hospital in Ann Arbor, MI revealed similar findings. Designed by HKS Architects, it is a wonderfully orchestrated, LEED- Silver design that successfully

integrates color into the design of the interior spaces. Lighting was also a major consideration as many of the public utilized a combination of accent lighting and color to define and activate the space. In a statement from the architects it was noted that, “This distinctive landmark is respectfully integrated into the health system campus for operational synergy, clarity of wayfinding and contextual harmony through material and color.” (“University of Michigan,” 2014) In this instance, the use of color throughout the design is clearly meant to provide additional information to patients and visitors alike. Color also indicates the coding of spaces; in many instances particular departments and corridors share a color theme that helps orient visitors and patients and allows them to navigate more easily. Additional accent lighting is commonly found along color-coded elements to further draw attention to information being relayed. The entrance lobby is a particularly well-defined space that incorporates lighting as well color. The shiny grey columns are accented by recessed lighting where they meet the ceiling; this detail activates the ceiling and compliments the colorful recessed lighting that borders the reception desk. The floor has a darker color scheme that contrasts the brightness of the space and gives depth to the lobby. Colorful toys also occupy the space and provide a welcome distraction for children while their parents are filling out paperwork.

In contrast to C.S. Mott Children's and Von Voigtlander Women's Hospital, Children's Hospital of Michigan (DMC) in Detroit is a poor example of the application of color in the interior design of a children's healthcare facility. Upon entering the facility, the visitor is directed towards a poorly lit lobby with very little visual interest. This does not match the exterior façade, which is a large curtain wall. A first time visitor expects the space to be bright and vibrant, but instead, is disappointed by this underwhelming space. Again, unlike C.S. Mott Children's Hospital, there are no colorful toys in the lobby area and very little color used in the space. The only application of color appears in the flooring as a wayfinding element, but it is too subtle and not very successful at indicating directional information. Near the elevators in the corridor, there is a colorful tiled art piece depicting a tree. It sets the color scheme for the majority of the interior, but feels random and disconnected to the site, building and larger context of the design. Other art pieces found throughout the building also appear randomly and have very little relevance to the overall design. Historical plaques placed along the chosen corridors depict events in Detroit's past but do not have any relevance to medicine or any other decoration in the hospital. They feel out of place in a children's hospital. The patient rooms are completely white, and unwelcoming to children. They are intimidating and do not provide any visual distractions from the medical equipment. Overall, the design of the interior is very poor and offers

very little comfort for patients and visitors. There is very little variety in the color schemes used throughout the building, poor signage and wayfinding clarity, and no visual distractions to help relieve stress. In contrast to the afore mentioned designs, this case study offers poor examples of color application, but it can be successfully utilized to assess target areas where healthcare designers should further concentrate their efforts.

Conclusion

The results imply a wide range of potential design implications that should be considered when designing future children's healthcare facilities. The use of color in the design of children's healthcare environments should be strategic, deliberate, playful, but most importantly informative. Color applications have the potential to be utilized as a strong, multifunctional design tool that can relay multiple layers of information simultaneously. Considering the particular color applications reviewed in the case studies site observations, the most successful designs are those that use color as a tool and not as arbitrary decoration. The application must be deliberate enough for patients and visitors to perceive that information is being conveyed. In the example of Children's Hospital of Michigan in Detroit, the use of color was too subtle to effectively inform patients and visitors of any new information, such as wayfinding cues or spatial

definitions. The individual instances of color application are perceived as arbitrary, and therefore, their functions are rendered practically useless. Designers need to be confident in their strategic use of color.

The case studies, site observations, and literature review collectively prove that color applications can be effectively utilized 1) as a distraction technique in younger patients, 2) as a means to familiarize a patient with his or her surroundings by emulating residential characteristics, 3) as a coding device to identify wayfinding and spatial boundaries, and 4) as a means to soften an otherwise stark, institutional space. The design team can achieve all four of these focus areas rather easily through various design methods and should strive to successfully integrate these characteristics into any healthcare facility that caters to younger patients. Effective design solutions to achieve distraction techniques might include using color, patterns, and graphics in the corridors, lobby, waiting rooms, and most importantly the patient rooms. These design elements should not be limited to the wall applications; ceilings and flooring can also provide a canvas for creative opportunities. Designers should consider a color theme, but allow for creative variations within the theme to add interest to the overall design. This leads directly into the second characteristic that should be achieved. Designers need to consider how patient rooms might more closely resemble a child's bedroom. Staying overnight in a foreign environment can be intimidating, so

designers should create themes for rooms that are interesting, warm, and comforting. This can be achieved by specifying colorful furniture, specifying colorful bedspreads, adding child-themed art or graphics, or letting the child choose particular environmental factors, such as lighting. Using color to indicate wayfinding and spatial boundaries is simple and can be done through the use a color changes or material changes. Designers should consider a color or material theme, but should also allow for some variations within the theme that might promote visual interests or add contrast to adjacent spaces. All three of these tactics help to accomplish the final application, which is to use color as a means to soften stark, institutional spaces. Visitors and patients alike understand that hospitals are sterile environments, but those stark white interiors do not lend themselves to healing. The successful applications of color can take this hostile environment and can make children's healing environments friendly, interesting, and less stressful.

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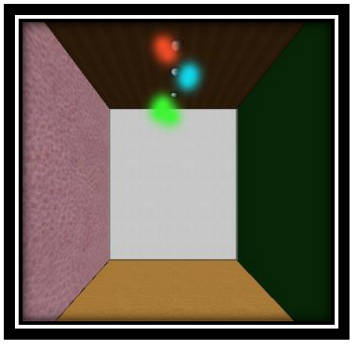
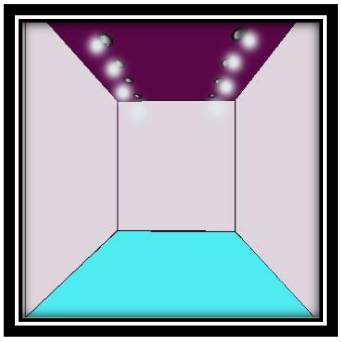
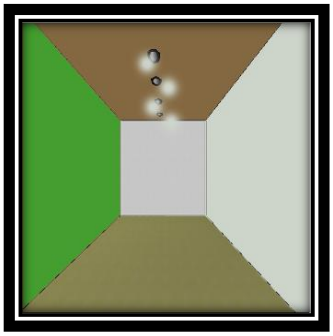
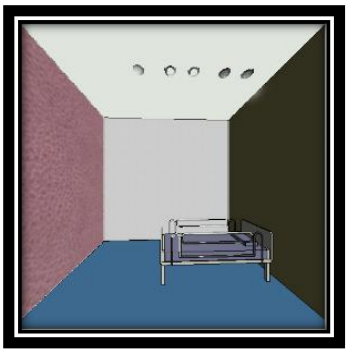
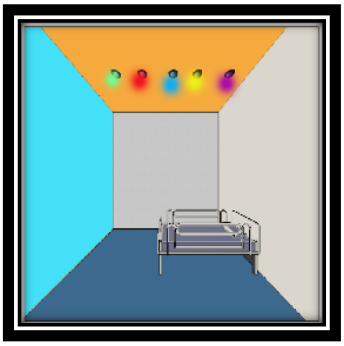
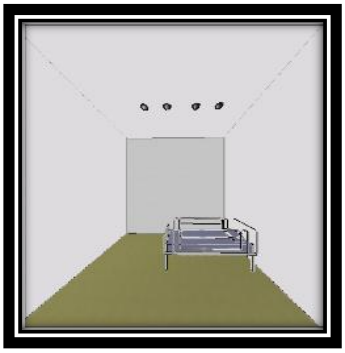
Appendix

Randall Children's Hospital (Figure-A1)

Phoenix Children's Hospital in Phoenix (Figure-A2)

Nemours Children's Hospital (Figure-A3)

	Phoenix	Nemours	Randall
Hallway			
Patient room			
Lobby