

## 02.

### POSITIVE DISTRACTION AND AGE DIFFERENCES:

*Design Implications for Pediatric Healthcare Environments*

**Samira Pasha, PhD, EDAC,** *samira.pasha@perkinswill.com*

**Jamie Huffcut, NCIDQ, EDAC, LEED AP ID+C,** *jamie.huffcut@perkinswill.com*

**Tama Duffy Day, FIIDA, FASID, LEED AP BD+C,** *tama.duffyday@perkinswill.com*

#### ABSTRACT

This study was conducted as part of an existing facility evaluation before design of a specialized pediatric clinic in Northern Virginia. The goal of the study was to investigate the positive distraction techniques staff use for pediatric patients during medical visits, and the possible role of the built environment in supporting these techniques. Applicability of each technique for different pediatric patient age groups, ranging from infants to 19 year olds was studied.

A retrospective survey method was used for data collection. Thirty-six staff completed the survey and responded to questions regarding various distracting techniques used and sources of disruptive noise. Results showed a significant difference in type and frequency of distraction techniques used for different age groups. Research findings suggest the need for establishing design guidelines that accommodate alternate methods of distraction as well as the needs and preferences of different pediatric age groups.

**KEYWORDS:** children outpatient clinic, decoration, color, environmental stimuli

### 1.0 INTRODUCTION

#### 1.1 Previous Research

In 2010, the design and fit-out of a specialty pediatric cardiac clinic in Washington DC was completed. The 11,000 square foot clinic within an existing hospital was relocated to the new space which was created to support: increased access to daylight, improved staff respite areas, improved acoustics, improved wayfinding through pattern and color, improved staff and patient flow, and appropriate design for multiple patient types including expectant mothers, children, adolescents and adults with congenital heart conditions.

The design team conducted pre- and post-occupancy evaluation surveys to assess effectiveness of design in addressing project goals. The hypotheses were (1) incorporating daylight in corridors, staff work areas, and the waiting room would improve staff satisfaction; (2) strategic use of color and pattern along main paths of

travel would improve wayfinding; and (3) utilizing a subtle color palette and non-childlike imagery would appeal to all patient types.

In 2010, 43 staff members responded to an online questionnaire in the existing clinic space. After three months in the new space in 2011, 48 staff members completed the same online survey. The results demonstrated a positive trend when comparing the old and the new facilities on the topics of access to daylight, wayfinding, and a cheerful but non-childlike design<sup>1</sup>.

After completion, the design team was hired to design an additional specialty pediatric clinic for the hospital, an outpatient facility outside the main hospital campus. The team was convinced to incorporate similar design features into the new clinic based on the previous findings. However, the design team's questions regarding appropriate color palette and appropriate use of childlike imagery were still unanswered. Healthcare environ-

ments tend to use color, pattern, and childlike imagery liberally to provide positive distraction in pediatric patients to reduce perceived pain and stress. While findings of the pre- and post- occupancy evaluation in the prior clinic showed a subtle color palette was preferred by staff, the design team questioned: (1) Is the liberal use of color, patterning and child-like imagery the foremost means of positive distraction for pediatric patients and; (2) If a successful means of positive distraction is the profuse incorporation of color, decoration, and child-like imagery; are they appealing to all pediatric age groups?

### 1.2 Ethical Considerations

This study was exempt from the Institutional Review Board's full review because the research protocol imposed minimal risk to participants, did not include vulnerable groups, and ensured anonymity of participants. The study was approved by the clinic's facility manager.

### 1.3 Review of the literature

In 2006, Dijkstra, Pieterse, and Pruyn reviewed literature pertinent to healthcare design and patient outcomes and concluded that ambient elements and design features can impact severity of pain, stress, and anxiety<sup>2</sup>. Available research shows that distraction from medical examination or procedure can decrease feelings of pain, fear, and distress through reducing the regional cerebral blood flow and mental capacity to process pain<sup>3,4,5</sup>. While several interventions can contribute to patient distraction, research often supports use of positive distraction in a healthcare setting, which can reduce patient stress, as well as negative feelings and thoughts<sup>6,7,8</sup>.

Generally, activity oriented positive distractions are used with children during a medical examination, to keep them occupied. For example, in 1994, Vessey, Carlson, and McGill studied children three-and-a-half to 12 years old who were undergoing blood draws and found that using a kaleidoscope during the procedure could decrease reported pain<sup>3</sup>. Distraction through touch and bubble blowing has also shown to decrease pain reported by children during injections<sup>9</sup>.

Non-activity oriented distractions include the incorporation and manipulation of various physical elements such as color, light, texture, shape, pattern, and scale, which can create stimulating environments for children. These design interventions intended to provide positive distraction for children, however, sometimes are based on an adult's perception of a child's ideal environment

or preferences of healthy children. This may lead to disproportionate amounts of brightly colored pediatric healthcare environments<sup>10</sup>. It is noteworthy that adult perceptions are not a true indicator of children's preferences<sup>11</sup>. Additionally, pediatric patients may be experiencing negative emotional states, which may lead to reactions to environmental stimulation that are different than those of healthy children<sup>12</sup>.

For patterns and decorations, in 2006, Blumberg and Devlin showed that blatant symbols of childhood are not favored by children and adolescents ages 10 to 19 years of age<sup>13</sup>. Color studies show that preferences also change with an individual's age<sup>14, 15, 16</sup> and over time as children develop<sup>17,18</sup>. Distinctions should be made between strategic use of color as a visual cue for wayfinding or positive distraction, and overstated use of colorful patterns. While the former can create a visually soothing environment, the latter may increase stress and mental chaos through information and sensory overload.

### 1.4 Problem Statement and Research Hypothesis

In creating healing healthcare environments for children, additional research is needed to better understand children's preferences and needs. Much of the available research on healthcare environments has focused on healthy adults or adult patients and cannot be applied with confidence to pediatric healthcare environments. Moreover, little research is available regarding appropriate environments for pediatric patients, while making a distinction between younger children and adolescents.

With this background, the following statements were hypothesized: (1) positive distraction techniques used by clinical staff vary per patient age group and (2) positive distraction techniques are not exclusively visual elements dependent on the built environment.

## 2.0 RESEARCH METHOD

A survey was distributed to staff in the existing specialty pediatric outpatient clinic in May 2012. Seventy two percent of staff completed the survey. The survey was developed by authors and included 10 questions and covered three main constructs: (1) respondent demographics, (2) distraction techniques used for each patient age group, and (3) staff perception of patient noise level. Before the survey was administered, a nurse staff reviewed the questions to ensure suitability of the questions.

*Staff demographics:* This item included staff gender, role, age, and years of work at the clinic. The surveys were distributed anonymously and no data that could identify the participants by name was collected.

*Distraction methods:* Pediatric patients were categorized in four age groups:

- 1. under two years old,
- 2. between two and six years old,
- 3. between seven and 12 years old and
- 4. between 13 and 19 years old.

Staff were asked to indicate the distraction techniques employed for each patient age group. The distraction techniques were derived from the literature. A senior nurse staff reviewed the survey and confirmed appropriateness of the items provided in this question. These items included: “Point at decorations and patterns”, “Get help from parents”, “Point at views from the window”, “Use toys and other objects”, “Talk to them”, “Sing to them”, and “Encourage relaxation and breathing” (Figure 1).

*Displays of discomfort:* Healthcare practitioners use various scales to assess levels of pain and stress experienced by patients. Such tools are generally intended for young children, sedated patients, or the cognitively impaired, who are unable to communicate discomfort verbally. Examples of scales include: FLACC scale<sup>19</sup>, CRIES<sup>20</sup>, and COMFORT<sup>21</sup>. These tools rate various indicators, such as crying, physical movement, muscle tone, and facial tension to rate level of pain perceived by patients. “Crying” was the only category used in all of these assessment tools, and, more specifically, it has been used as the sole representation of levels of perceived pain in Baker Faces Pain Scale<sup>22</sup>. Thus, to measure overall levels of perceived pain and stress in patients, staff responded to questions regarding noise levels in the clinic and the percentage of that noise originating from patients crying in the exam rooms or waiting area.

|                                    | Children<br>Under 2<br>Years old | Children<br>Under 2-6<br>Years old | Children<br>Under 7-12<br>Years old | Children<br>Under 13-19<br>Years old |
|------------------------------------|----------------------------------|------------------------------------|-------------------------------------|--------------------------------------|
| Usually don't distract             |                                  |                                    |                                     |                                      |
| Point at decorations and patterns  |                                  |                                    |                                     |                                      |
| Get help from parents              |                                  |                                    |                                     |                                      |
| Point at views from the window     |                                  |                                    |                                     |                                      |
| Use toys and other objects         |                                  |                                    |                                     |                                      |
| Talk to them                       |                                  |                                    |                                     |                                      |
| Sing to them                       |                                  |                                    |                                     |                                      |
| Encourage relaxation and breathing |                                  |                                    |                                     |                                      |
| Other                              |                                  |                                    |                                     |                                      |

Figure 1: Sample survey question.

### 3.0 RESULTS

#### 3.1 Research Population Demographics

Seventy-two percent of staff who were asked to participate returned their completed surveys within two weeks. Among the 36 respondents, 33 were female and three were male. More than 61 percent were between 22 to 45 years of age, around 33 percent were between 45 to 64 years of age, and the remaining were over 65 years old. Thirty-six percent of respondents were administrative staff, 36 percent were identified as a nurse, nurse practitioner, or technician, and 13 percent were physicians, 3 percent were psychologists and the remaining selected "other" as their functional role in the clinic.

#### 3.2 Sources of Noise

Staff were asked to rate sources of disruptive noise within the clinic on a 5 point scale, with "1" being less disruptive and "5" being the most disruptive. Staff reported children playing in the waiting area (3.5), children crying in the waiting area (3.4), and children crying in the exam rooms (3.4) as the major sources of disruptive noise in the clinic. Noise of people talking in corridors (2.9) and equipment (1.7) were not as disruptive as children crying or playing (Figure 2). In general, reported noise levels were moderate in all areas mentioned in the question: exam rooms were rated 2.6, staff offices were also rated 2.6, and the waiting area was rated 2.9.

#### 3.3 Positive Distraction Techniques Used

Figure 3 represents a summary of staff responses to the question "How often do you distract patients during a medical visit?" per age group. Forty-four percent of staff said most of the time they distract children under the age of two during a medical visit. Only 2.7 percent of staff said that they distracted adolescents, patients between 13 to 19 years olds, "Most of the time". Overall, Figure 3 compares frequency of each distraction techniques used for different age groups. Distraction is more frequently employed for patients under six years of age compared to patients seven and older.

Figures 4 through 7 demonstrate distraction techniques staff employed per age group. It is noteworthy that while a wide variety of methods are used for patients six years old and younger (Figure 4 and 5), only two techniques are typically used to distract adolescents ages 13 to 19: "talk to them," and "encourage relaxation and breathing" (Figure 7). In the case of patients six years old and younger, "point at wall decorations and patterns", "use toys and other objects", "get help from parents", and "talking" provided the major means of distraction from the medical visit. These techniques were followed by "point at views from the window", "sing to them", and "encourage relaxation and breathing" (Figure 4 and Figure 5). For children 7 to 12 years old, The same variety observed for younger children is present, however, a larger emphasis is put on "talk to them" and "encourage relaxation and breathing", similar to children 13 to 19 years old (Figure 6).

## Positive Distraction and Age Differences

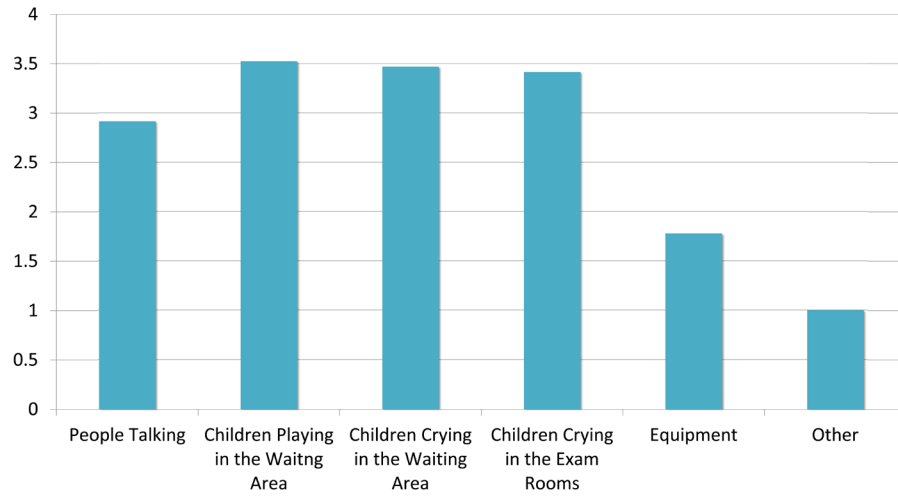


Figure 2: Sources of disruptive noise rated by staff.

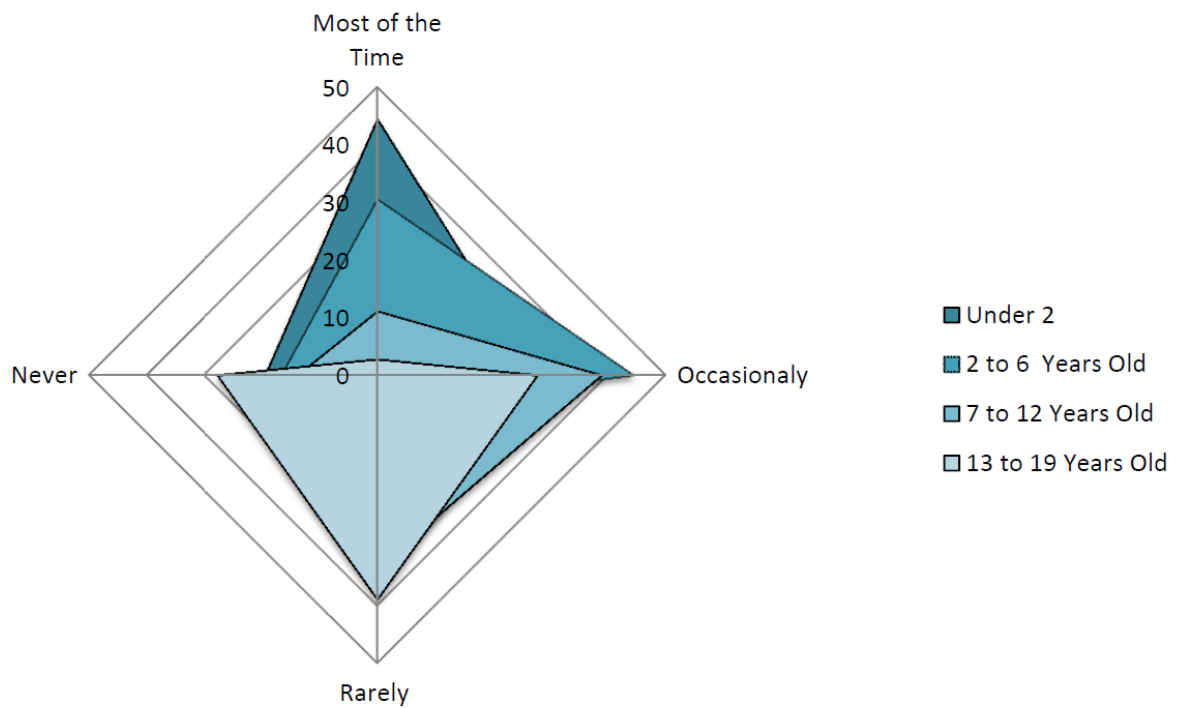


Figure 3: Frequency of distraction used during medical visit for each age group.

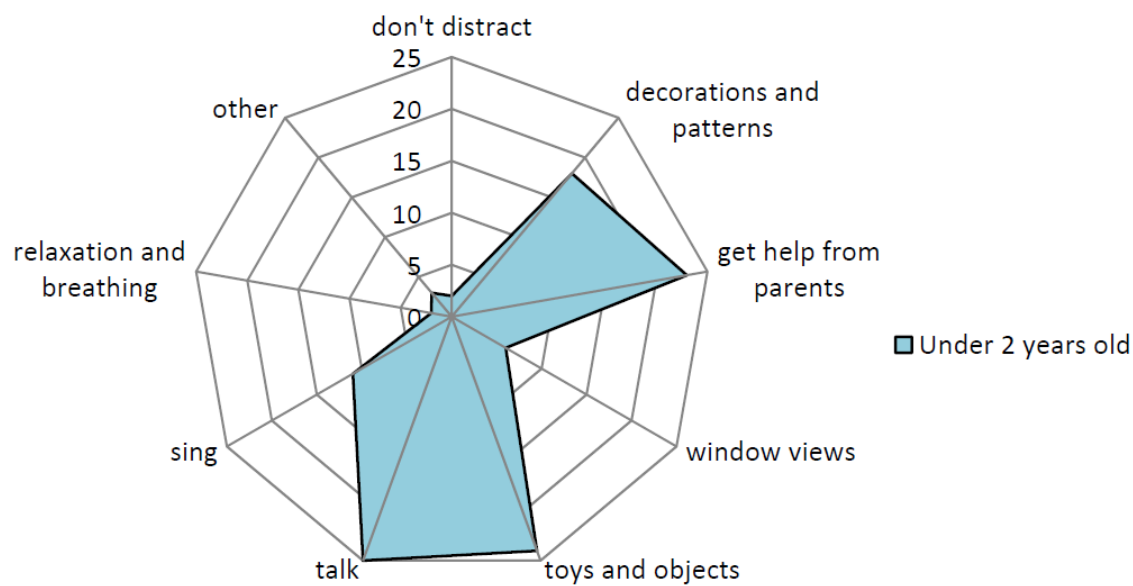


Figure 4: Distraction techniques used for children under 2 years old.

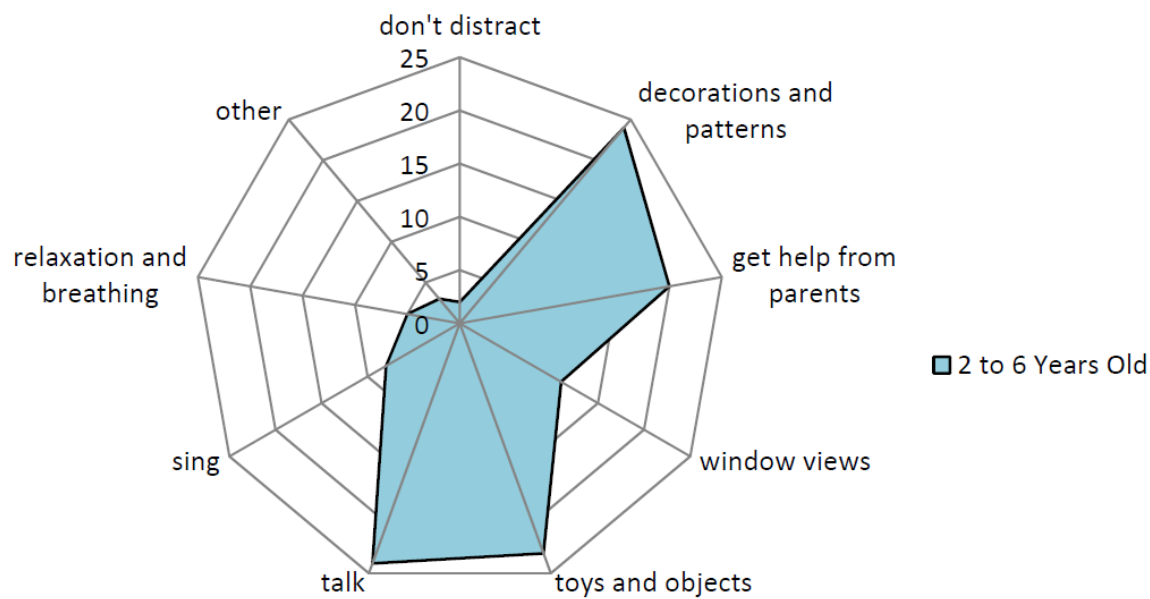


Figure 5: Distraction techniques used for children 2 to 6 years old.

## Positive Distraction and Age Differences

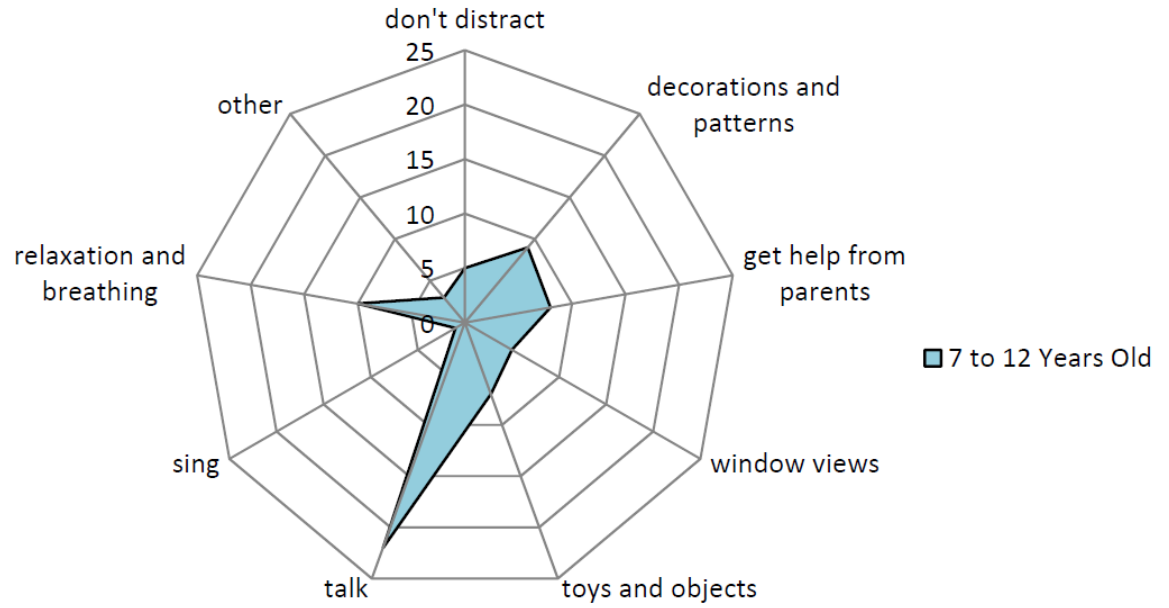


Figure 6: Distraction techniques used for children 7 to 12 years old.

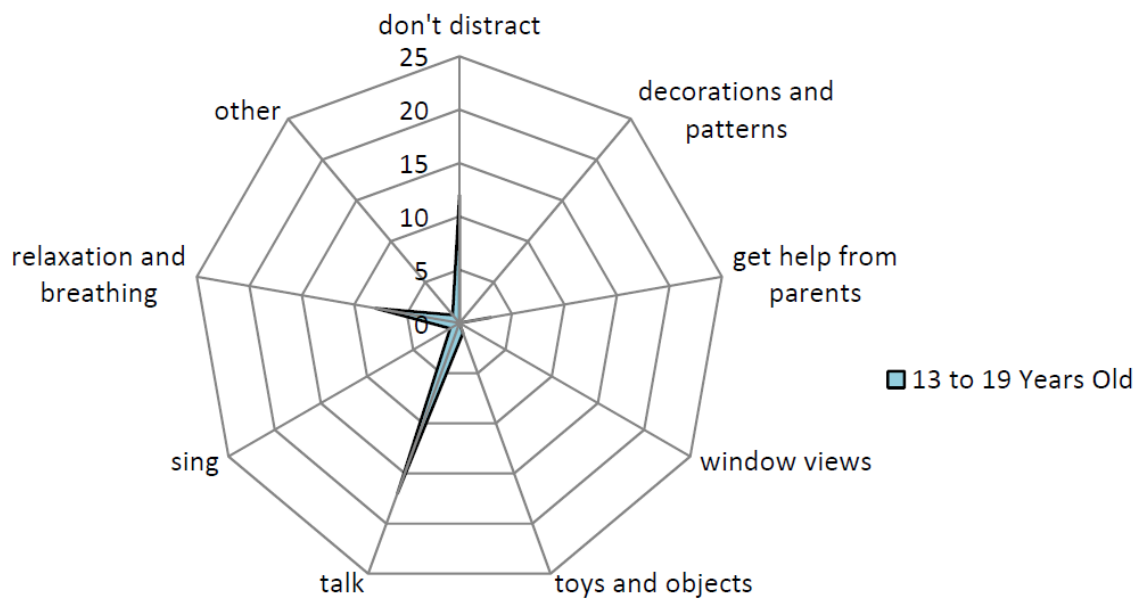


Figure 7: Distraction techniques used for children 13 to 19 years old.



Table 1: Table of frequencies for distraction techniques used per age group.

|          | Group 1 |                      |                       |      |                                    | Group 2               |  |                |
|----------|---------|----------------------|-----------------------|------|------------------------------------|-----------------------|--|----------------|
|          | talk    | use toys and objects | get help from parents | sing | encourage relaxation and breathing | point at window views | point at wall decorations and patterns | don't distract |
| Under 2  | 25      | 24                   | 23                    | 11   | 2                                  | 6                     | 28                                     | 2              |
| 2 to 6   | 24      | 23                   | 20                    | 8    | 5                                  | 11                    | 24                                     | 2              |
| 7 to 12  | 22      | 7                    | 8                     | 1    | 10                                 | 5                     | 9                                      | 5              |
| 13 to 19 | 17      | 1                    | 3                     | 1    | 8                                  | 0                     | 0                                      | 12             |

A contingency table (Table 1) was created, which compared the frequencies of each technique used for each age group. The techniques are organized in two groups; group 1 consists of techniques that can be independent from the physical environment, and groups 2 includes techniques that are more directly related to the built environment.

#### 4.0 RESULTS

This study investigated pediatric patient discomfort during a medical visit from two different perspectives: (1) Patient display of discomfort through crying and (2) staff techniques to reduce patient discomfort through positive distraction.

Analysis of data pertaining to noise level showed “children crying” as a major source of noise in both exam rooms and waiting area. This can indicate the level of discomfort or stress among the patient population. Staff responses to questions regarding frequency of distraction technique use revealed that some form of distraction is more commonly practiced for patients six years old and younger. Most staff responded they distracted patients older than seven “occasionally” or “rarely”. Staff used a variety of distraction techniques comprised of activity-oriented, auditory, and visual distractions for younger children. However, for adolescent patients, staff only talked to them or encouraged breathing for relaxation. Future research may focus on studying alternate distraction techniques for adolescents and respective effectiveness.

Results of this study showed that, in terms of distraction technique types and frequencies, adolescents seem to be treated in a more adult-like fashion. Considering that adolescents tend to act more adult-like compared to younger children, it is unknown whether the techniques employed by staff are a response to adolescents’ per-

ceived levels of stress and pain or their adult-like displays of stress and discomfort.

Responses to the question regarding types of distraction techniques employed showed that wall decorations and patterns are only one of several techniques used to create positive distractions for pediatric patients. Staff used such elements to distract younger patients and did not report using them for teenagers. Future studies should investigate the reasons for this. However, our speculation is that: 1) teenagers don’t need to be pointed at wall decoration to notice them; 2) such elements are not attractive for teenagers and may be perceived as too juvenile.

This research was conducted as a part of a pre- and post-occupancy evaluation for the new clinic. One limitation of this study is utilizing surveys as the only research method. Behavior observations in the waiting area and exam rooms could have better captured the effectiveness of distraction techniques used. Another limitation of the study, which was imposed by time and staffing constraints, is the retrospective nature of surveys. In this survey design staff responded to their general experience working with the patients in the past. Further research is needed to measure staff ratings for each individual patient concerning their age, gender, displays of pain and discomfort, and a relevant psychometric measure.

#### 5.0 DESIGN IMPLICATIONS

Based on the findings of this study and recommendations of the available literature<sup>23</sup>, design of pediatric healthcare settings should consider: (1) strategic use of decoration and patterning; (2) consideration and incorporation of alternate distraction techniques; (3) appropriate imagery for all age ranges; and (4) appropriate acoustics.

*Strategic Use of Color:* The results of the study supported the hypothesis that pattern and decoration is one tool among several others that are instrumental in providing positive distraction. Hence, pediatric design need not rely on wall decoration or patterning as only means of providing positive distraction. Clinical staff utilize a variety of techniques for distraction; thus, wall decoration, imagery, and patterning can be used strategically to address wayfinding or imperative distraction needs. In areas where decoration and pattern are not necessary to enhance wayfinding or delivery of care, reduction of such elements will avoid over stimulation.

*Alternate Distraction Techniques:* Design of the pediatric healthcare environments should be supportive of the diverse pool of positive distraction techniques used by staff. In areas where patients may feel discomfort, the design team should allow for additional interventions such as window views, storage of toys and objects easily accessible by staff, child scale and innovative furniture design, and music. Incorporating alternate distraction methods within the built environment will support strategic use of color, pattern, and decoration.

*Appropriate Imagery:* The significant difference observed between distraction techniques used for different age groups supports the hypothesis that different age groups have different needs and preferences. While staff can adjust their distraction method considering the age of each patient, the built environment remains constant. Observations from most pediatric care centers show a tendency to create environments that are thought to be appealing for younger children, while overlooking the needs and preferences of older children and adolescents.

In a pediatric setting with patients ranging in age from infancy to 19 years old, special attention should be paid to accommodate all patient age groups. Incorporating only child-like, overly simplistic imagery in a pediatric space may alienate teenagers, reducing satisfaction with their treatment.

*Acoustics:* Auditory distraction is often employed by staff through talking to patients, singing to patients and asking parents for assistance. As a result, designing to the right level of sound absorption will increase the effectiveness of these tasks and therefore foster better communication between staff and patients. Furthermore, pediatric settings with the proper acoustics will isolate disruptive noise from crying patients and subsequently can help reduce disruption and stress levels for staff and other patients and visitors.

## 6.0 CONCLUSION

Evidence based design has gained popularity in the past years, and has encouraged the practice of healthcare design to incorporate research findings into their decision-making process. The notion of research-informed design, however, is dependent on availability of research that can answer specific design questions. Often times, healthcare designers confront questions that are not addressed by the available body of research, are specific to their design problem or population, or are challenged by contradicting research findings. In such cases, and as part of the design process, designers may investigate best responses to their design questions through in-house research.

The present study is the first phase of a two phased study. The first phase aimed to answer a design question and generate design guidelines. The design guidelines were implemented in design and construction of the new facility. Through phase II, the new facility will be evaluated to assess the effectiveness of design in addressing the design objectives. The study provides an example for research-integrated design, through which, research answers the design questions, and design evaluation examines accuracy of research findings.

## Acknowledgments

The authors would like to acknowledge and extend their gratitude to the following individuals for their time and contributions to this article, research, and previous related research:

Jeanne Ricks, Children's National Medical Center  
Beth Benner, Children's National Medical Center  
Jeff Bartlett, Children's National Medical Center  
Steve Saunders, Children's National Medical Center  
Chris Steinmuller, Children's National Medical Center  
Nancy Eling, Children's National Medical Center  
Matt DeGeeter, Perkins and Will  
Deborah Smith, Perkins and Will  
Elizabeth Brinkley, Perkins and Will

## REFERENCES

[1] DeGeeter, M. J., Lanes, H., (2011). "Designing for Health: Pre- and Post- Occupancy Survey Influencing Design", *Contract*, 23 March, Retrieved on 6/28/2012 from <http://www.contractdesign.com/contract/design/features/Designing-for-Health-4664.shtml>

- [2] Dijkstra, K., Pieterse, M., and Pruyn, A., (2006). "Physical Environmental Stimuli that Turn Healthcare Facilities into Healing Environments through Psychologically Mediated Effects: Systematic Review", *Journal of Advanced Nursing*, Vol. 56, No. 2, pp. 166-181.
- [3] Vessey, J., Carlson, K., and McGill, J., (1994). "Use of Distraction with Children During an Acute Pain Experience", *Nursing Research*, Vol. 43, pp. 369-371.
- [4] Petrovic, P., Petersson, K. M., Ghatan, P. H., Stone-Elander, S., and Ingvar, M. (2000). "Pain-Related Cerebral Activation is Altered by a Distracting Cognitive Task", *Pain*, Vol. 85, pp. 19-30.
- [5] Bantick, S. J., Wise, R. G., Polghaus, A., Clare, S., Smith, S. M., and Tracey, I. (2002). "Imaging How Attention Modulates Pain in Humans Using Functional MRI", *Brain*, Vol. 125, pp. 310-319.
- [6] Ulrich, R. S., (1981), "Natural versus Urban Scenes: Some Psychological Well-Being", *Environment and Behavior*, Vol. 13, No. 5, pp. 523-556.
- [7] Rubin H.R., Owens A.J. and Golden G., (1998). "Status Report (1998): An Investigation to Determine Whether the Built Environment Affects Patients' Medical Outcomes", The Center for Health Design, Martinez, CA.
- [8] van den Berg A., (2005). "Health Impacts of Healing Environments: A Review of the Benefits of Nature, Daylight, Fresh Air and Quiet in Healthcare Settings", Foundation 200 years University Hospital Groningen, Groningen.
- [9] Sparks, L., (2001). "Taking the "Ouch" Out of Injections for Children: Using Distraction to Decrease Pain", *American Journal of Maternal Child Nursing*, Vol. 26, No. 2, pp. 72-78.
- [10] Coad, J., and Coad, N., (2008). "Children and Young People's Preference of Thematic Design and Colour for Their Hospital Environment", *Journal of Child Health Care*, Vol. 12, No. 1, pp. 33-48.
- [11] Fraser, S., Lewis, V., Ding, S., Kellett, M., and Robinson, C. (eds) (2004). *Doing Research with Children and Young People*, London, UK: Sage.
- [12] Carpman, J. R., and Grant, M. A., (1993). "Design that Cares: Planning Health Facilities for Patients and Visitors", Chicago, IL: American Hospital Publishing.
- [13] Blumberg, R. and Devlin, A.S., (2006). "Design Issues in Hospitals: The Adolescent Client", *Environment and Behavior*, Vol. 38, No. 3, pp. 293-317.
- [14] Beke, L., Kutas, G., Kwak, Y., Young Sung, G., Park, D. S., and Bodrogi, P., (2008). "Color Preferences of Aged Observers Compared to Young Observers", *Color Research & Application*, Vol. 33, No. 5, pp. 381-394.
- [15] Milne, L. C., and Greenway, P., (1999). "Color in Children's Drawings: The Influence of Age and Gender", *The Arts in Psychotherapy*, Vol. 26, No. 4, pp. 261-263.
- [16] Zentner, M. R., (2001). "Preferences for Colors and Color—Emotion Combinations in Early Childhood", *Developmental Science*, Vol. 4, No. 4, pp. 389-398.
- [17] Dittmar, M., (2001). "Changing Color Preferences with Ageing: A Comparative Study on Younger and Older Native Germans Aged 19-90 years", *Gerontology*, Vol. 47, No.4, pp. 219-226.
- [18] Meerum Terwogt, M., and Hoeslma, J. B., (1995). "Colors and Emotions: Preferences and Combinations", *Journal of General Psychology*, Vol. 122, No. 1, pp. 5-17.
- [19] Merkel, S. et al. (1997). "The FLACC: A Behavioral Scale for Scoring Postoperative Pain in Young Children", *Pediatric Nursing*, Vol. 23, No. 3, pp. 293-297.
- [20] Bildner, J., (1996). "CRIES Instrument Assessment Tool of Pain in Neonates", Distributed by the City of Hope Pain/Palliative Care Resource Center.
- [21] Ambuel, B., Hamlett, K.W., Marx, C.M., and Blumer, J.L., (1992). "Assessing Distress in Pediatric Intensive Care Environments: the COMFORT Scale", *Journal of Pediatric Psychology*, Vol. 17, No. 1, pp. 95-109.
- [22] Baker, C. and Wong, D., (1987). "Q.U.E.S.T.: A Process of Pain Assessment in Children", *Orthopedic Nursing*, Vol. 6, No. 1, pp.11-21.
- [23] Shepley, M., Fournier, M., and McDougal, K., (1998), *"Healthcare Environments for Children and Their Families."* Dubuque, IA: Kendall/ Hunt Publishing Company.