CHILD-ADOLESCENT MENTAL HEALTH: USING SENSORY ENVIRONMENTS TO HELP PATIENTS DISCOVER A NEW REALITY
An examination of design strategies to influence patient care and outcomes

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EXECUTIVE SUMMARY
When a child presents at an inpatient mental health treatment program, they are living in a world that is out-of-proportion. From the very first step onto an inpatient unit, the healing process begins, and the environment that surrounds the patient has a profound effect on how the patient responds to treatment. As discussion on the need for effective mental health treatment grows, the environments that organizations create take on greater importance, especially for pediatrics. Looking at the research, this paper examines how spaces that support individual choices, physical and emotional needs, and safety can enhance the care and treatment of child and adolescent patients.

INTRODUCTION
A report by the Center for Disease Control and Prevention released in 2013 estimated that nearly 1 in 5 children in the United States experiences a mental health illness in a given year. Left untreated, they can manifest themselves in various fashions, as recent public tragic events have demonstrated (e.g., school shootings). Mental health disabilities contribute to increased demands on education, social services, youth justice systems, family and relationships, and a continued cycle of difficulties for the youth (Hackett, Aslam, & Theodosiou, 2011).

Fifty percent of those who present with a lifetime mental illness do so by the age 14 (HM Government, 2010). Properly diagnosed and treated, children and adolescents with mental illnesses can experience academic success, family cohesion, and both desired physical and social development.

As the focus of child and adolescent mental health treatment broadens and gains more public attention, stakeholders are emphasizing treatment outcomes according to evidence-based practice models (Hoagwood, Burns, Kiser, Ringeisen, & Schoenwald, 2001; Hoagwood, Jensen, Acri, Olin, Lewandowski, & Herman, 2012). Health
policy changes also are emerging and aimed to enhance implementa
tion and outcomes for child and adolescent mental health services (Hoagwood et al., 2012). The dissemination of evidence-based practices for mental health services parallels efforts in the design community’s emphasis to use available research (evidence-based design) to make more informed design decisions.

**POPULATION CHARACTERISTICS**

The most common disorders of children and adolescents admitted to a mental health unit are attention deficit disorder, anxiety disorder, affective-type disorders (suicidal behaviors, depression, projection, regression), psychotic disorders (poor reality-testing), autism, bipolar affective disorder, and environmental behavioral disorder (EBD) (e.g., White, 2013; Pottick, Hansell, Gutterman, & White, 1995). The symptoms of these disorders may increase (primarily seen through acts of aggression) early in the admission process as the child enters an unfamiliar environment with structures, limits, and boundaries that are different from their routine (Crocker, Stargatt, & Denton, 2010). Aggression during admission has been associated with longer length of stay and increased use of concurrent routine medications and may result in patient restraint or seclusion (Crocker, Stargatt, & Denton, 2010; Dean et al., 2010).

Patients with a history of aggression and conduct disorder typically respond poorly to treatment. Aggressive acts are common among male patients, while female patients display for self-harm. Female patients are likely to have a history of sexual or physical abuse and a diagnosis of borderline personality disorder (Barton, Rey, Simpson, & Denshire, 2001).

Beyond aggression and harm, there is a growing understanding of the links between emotional disorders and physical well-being. Overweight and obese youth report higher levels of depression along with higher levels of psychiatric diagnosis, particularly mood or anxiety related disorders (Janicke, Harman, Kelleher, & Zhang, 2008). Conversely, adolescents experiencing psychiatric conditions leading to inpatient hospitalization have been linked to a higher risk for becoming overweight or obese (Hasnain et al., 2008).

Beyond understanding the physical and emotional states of the patients when they arrive for admission, children experiencing a mental health crisis also place the parents in crisis. Exacerbated, concerned, and sometimes scared, the environments they see when leaving their children in an inpatient unit affects the confidence they have in both their choice to seek care and the quality of the care their child will receive. The culmination of these characteristics is changing the strategies for designing healing environments.

**ENVIRONMENTAL FACTORS**

Renowned child psychologist Bruno Bettelheim stated it succinctly: “It is the environment which conditions the kind of life that unfolds within it.”

From the overall space down to the smallest detail, the environment can communicate messages to the user, some desirable and
some undesirable (Cotton & Geraty, 1984). Environmental character-
istics effectively aid patient satisfaction and contribute to 
proved health outcomes, including reductions in length of stay and stress as well as improved patient privacy (Ulrich et al., 2008). In the same manner that the environment can improve outcomes, it can also negatively influence treatment if chaotic, random, and disorganized, causing children to react and adapt in negative ways (Bailey, 2002).

**Triggers for Aggressive Acts**

Daffren and Howells (2002) note, “physical characteristics of the ward, the rules and regulations by which wards operate, and the behavior of ward staff and other patients may also be perceived as provocative or demanding by inpatients, leading to an increase in aggression.” Certain environmental factors including time of day, patient location, and structured activity have been linked to the more aggressive behavior (Depp, 1976; Fottrell, 1980). The nature of the ward environment (Moos, 1974; Shah, Fineberg, & James, 1991) and the patterns of ward usage (admission rates and bed occupancy) (Fottrell, 1980) are also contributing factors, the most common including areas and times of transition where the environment is unfamiliar and undersupervised to the patient — providing opportunities for violence to staff. Low levels of structured activities and poor quality patient-staff interaction may elevate levels of violence and aggression (Daffren & Howells, 2002; Drinkwater & Gudjonsson, 1989).

Additional environmental factors such as irritating noise, lack of privacy, and less attractive presentation and poor building maintenance can indirectly contribute to aggression (Dietz & Rada, 1982; Wong, Slama, & Liberman, 1987).

Studies show the stress of overcrowding also plays a role in aggressive behavior, attributed to both overstimulation and lack of personal space (Edwards & Reid, 1983). Several research efforts identified behaviors such as withdrawal, agitation, and social isolation in schizophrenic patients as a result of others invading patients’ spatial boundaries (Brooks, Mulaid, Gilead, & Daniels, 1994; Sommer, 1969; Horowitz, 1968; Maxwell, 1996).

**Reducing Aggression: Environmental Quality and Nature**

Air and odor quality impacts patients directly, as both measures often play a role in physical comfort, affecting mental stability. Air quality should include good ventilation with as much exposure to fresh air as possible as well as maintaining a neutral odor (e.g., Karlin & Zeiss, 2006). Views of nature (whether actual or through artwork) can reduce psychological distress.

Beyond air quality and views, sound plays a key role in a patient’s treatment. As highly reverberant spaces can play a triggering role, emphasis on quality and properly specified mechanical and electrical systems needs to occur during the design process. With research recommending environments avoid echoic spaces, organizations should also avoid spaces such as long corridors, as they can lead to patients’ perceptual distortions (Karlin & Zeiss, 2006).

**Reducing Aggression: Lighting**

Building upon the existing body of knowledge, there are several lighting design strategies that can improve patient conditions in inpatient settings. Higher levels of sunlight in patient-occupied spaces can improve the body’s circadian system which can reduce
found that introducing incandescent lamps and light fixtures with dimmer controls provided a calmer environment through the warm lighting while the patients felt sense of control of the space using the dimmers.

**Sense of Calm, Choice, and Control**

The environment can serve as a prominent driver for creating a culture of calm in a child-adolescent mental health unit. Views to nature, positive distractions, and patient choice and control (through lighting and acoustics, for example), are strategies that can promote a sense of calm and create a therapeutic environment (Curtis, Gesler, Fabian, Francis, & Priebe, 2007; Karlin & Zeiss, 2006; Ulrich, 2013; Ulrich et al., 2008). Physical environments that display welcoming features and warmth, rather than “hospital” or “prison-like” features, provide a nurturing environment to promote the developmental needs of children (Bailey, 2002). “In an institutional, therapeutic environment, the physical structure plays an important role in making the residents feel either that their behavior is controlled or that they themselves can develop control of their behavior, emotions, and lives (Bailey, 2002, p18).”

**Sense of Privacy**

The need for some privacy and a sense of personal autonomy is common to all children and adolescents whose minds and bodies are still developing (Csikszentmihalyi & Rochberg-Halton, 1981). Lack of privacy can lead to negative behaviors, especially among adolescents. In Bailey’s (2002) literature review, he draws attention to privacy:

“Stimulus shelters,” alcoves or small rooms, other than seclusion rooms, that can be accessed by children can offer them a place to withdraw from chaotic or noisy surroundings. Care must be taken, however, that these areas of retreat not become used for seclusion. Having access to their own private bedrooms can be a stimulus shelter as well. Also, rooms for group meetings should offer privacy (p20).

Understanding that giving privacy to this specialized population generates issues of safety concerns for caregivers, Bailey (2002) offers examples of ways to provide children a sense of more “space” and reduce the feeling of crowding. Quiet spaces away from the main traffic route, such as window seats or reading nooks, can still provide visual connections with caregivers. Interior glazing and thoughtful lighting provisions can also help patients feel a sense of privacy while maintaining visibility for patient safety (Thompson, 2010).

**Comfort and Acceptance**

Comfortable and inviting environments, whether for treatment or otherwise, engage all the senses — sight, sound, smell, and, also, touch. Incorporating items that invite touch and sensory percep-

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Spaces for of high levels of socialization such as the dining area (top) and spaces with lower levels of socialization such as the “porches” (lower) allows for the patients to be in a more public area while still maintaining a sense of boundary by close adjacencies to their rooms.

the effects of depression and bipolar disorder (e.g., Karlin & Zeiss, 2006; Beauchemin & Hays, 1996; Benedetti, Colombo, Barbini, Camperi, & Smeraldi, 2001, Joseph, 2006, Bendetti, Colombo, Barbini et al, 2001). Ulrich and associates (2008) noted “hospitals, in particular mental health facilities, should be designed and sited to ensure that depressed patients have abundant natural light.”

Beyond benefitting patients with depression, sunlight can improve upon job satisfaction among employees and reduce work-related stress. As Joseph (2006) points out, exposure to sunlight at least three hours a day was found to cause less stress and higher employee satisfaction, both directly and indirectly. By improving visual tasks, better lighting can reduce workplace errors which can lead to lower stress levels.

Better lighting is not limited to the idea of more daylight. While studying children with autism in educational facilities, Long (2010)
Textures, curves, colors, and nature-inspired design provides a more welcoming and comforting environment for child and adolescent care.
CASE STUDY: UNIVERSITY OF MINNESOTA HEALTH, MASONIC CHILDREN’S HOSPITAL, CHILD-ADOLESCENT MENTAL HEALTH UNIT
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Overview
The vision for the University of Minnesota Health, Masonic Children’s Hospital Mental Health Services is to bring hope and healing to the children and their families by caring for one patient at a time, while maintaining advancements in education, research, and care on behalf of all children. As a patient-centered team, Masonic creates exceptional care experiences.

Children and adolescents conditioned to inpatient treatment often have a history of trauma and/or developmental delay. They may experience depression, psychosis, anxiety, bipolar affective disorder, or any combination of emotional, behavioral, or mental disorders that impair their ability to function safely in home and community settings. While patients experience varying degrees of behavioral dysregulation, all show some level of vulnerability, necessitating an environment that allows for sensory, social/emotional, and physical accommodations.

In 2011, the hospital received a generous donation to rebuild the child/adolescent mental health inpatient, intensive treatment center, and dual diagnosis units. This 31,000 s.f. renovation project created new inpatient mental health facilities specifically designed for children and adolescents. Floors within an existing building adjacent to the new Masonic Children’s Hospital (formerly Amplatz Children’s Hospital) were transformed into two treatment units: one for child-adolescent behavioral health (including an intensive treatment unit) and another for adolescent dual diagnosis. The project also included improvements to a therapeutic pool and creation of a secure outdoor play area.

Design Strategies
Behavioral health care has very unique requirements, most of which are a balance of creating a space that is at once extremely safe, welcoming, healing, and friendly. A project driver was to design a forward-looking mental health facility that is more open and inviting to children and their families. This meant including natural light whenever possible, carefully placing color and design details, and developing healing spaces specific to children.

Beyond the usual facilities and design participants, project design workshops also included conversations with patients, their families, and a team assembled from the National Alliance on Mental Illness (NAMI). These discussions inspired the design team to look beyond planning issues and create a distinctive environment.

Color and Curves
Design incorporates vibrant colors and curves to create a welcoming and calm environment for patients and families. The environment is a visual symbol of hope and contributes to reducing the stigma of institutionalized environments for mental health care.

Choice and Control
Patients are able to control their environment through lighting (dimming and color changing) and music control panels in many of the activity, therapy, and group rooms.

Balancing Privacy and Socialization Choices
Patients have a variety of privacy and socialization desires while coping with a mental illness and treatment. Options within the inpatient unit include window seats just off the main corridor, a quiet room, sensory room, and large social spaces. A unique feature to assist with patient behavior negotiations are the porch areas directly outside the patient rooms. The porches allow staff to work with each patient on transitions and balancing socialization.

Fostering Physical Activity
Spaces to be active and expend energy are found throughout the units, from a sensory room (with zip line) to an activity room.
“The beauty of all of this is that we finally have the right talent in the right places to start publishing for the first time ever. We can to get the word out on our innovative approaches — I am convinced we are leading the way in pediatric mental health care and I am excited for other units around the country to benefit from what we are doing.”

Karen Wendt, Program Director
University of Minnesota Health, Masonic Children’s Hospital

(with Xbox 360). Additional spaces for activity located off the unit include a recommissioned pool and new outdoor playground.

Connection to Nature
Located in an urban setting, the design incorporates the natural environment through large windows in all patient rooms to provide natural light, nature-inspired artwork and signage, and patient access to the outdoor playground and raised gardens.

Environmental Research: Does Design Matter?
A research study is exploring the spatial attributes as a contributing influence to behavior and well-being for patients, staff, and families on this child-adolescent mental health unit. Using a mixed methods study approach, data collected and analyzed is building on knowledge to inform future design models for mental health care facilities. Tools utilized in this study include staff surveys, staff interviews, and patient image surveys.

Staff comments from the online survey and interviews reveal early findings showing overall influence as positive. The staff members attributed the positive experiences to the wide variety of programmed spaces that allow them to properly calm/de-escalate patients. The variety allows staff to address the unique needs of individual patients. The specific rooms and features mentioned in the online surveys as well as the interviews were the Rainbow Room, playground, pool, and the porch spaces directly outside the patient rooms.

The patient image survey findings echo many comments from staff on the same features cited for their calming effects. Highest ranked features (according to the patients) include the Rainbow Room, pool, playground, his/her room, and controllable items such as the music panels and colored lights.

Conclusion and Next Steps
While studies through the decades have examined individual factors and their influences on therapies and patient outcomes, putting to practice many of the aspects together is allowing us to examine their effects in totality on the therapeutic environment. As a greater emphasis is placed on mental health treatment and early interventions, this knowledge will allow health care organizations to make more informed and confident decisions when creating new environments to provide treatment, leading to better outcomes for patients and their families.

Patients felt most calm as a result of spending time in the Rainbow Room (group room), his/her room, pool, and playground. Other calming features were those that could be controlled by the patient such as the colored lights and the music panels.
REFERENCES