Planning for Intentional and Effective Places and Spaces for Children's Positive Mental Health Integrated Plan

Literature Review, Expert Interviews, and Additional Resources

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Literature Review Executive Summary

Background

This literature review is a product of the Planning for Intentional and Effective Places and Spaces for Children's Positive Mental Health project. This review of the evidence along with interviews with and other input from expert researchers and practitioners, aims to provide stakeholders with the information necessary to make decisions about which types of places and spaces to focus on and what approaches to use for the best possible results for children and families.

The review examines current knowledge about a wide range of characteristics of the physical and social environment that influence children's social and emotional development. The review includes multiple types of places frequented by children, such as schools and child care centers, green spaces and playgrounds, hospitals, and public housing. The authors also examine specific characteristics that either promote or hinder child development, including the presence of art, crowding, light, noise, and toxic elements. Finally, the review turns to two key aspects of planning spaces for children: accessibility of the space and participation in the space's design.

Methodology

This literature review identified over 200 relevant sources from peer-reviewed journals, books, and reports from governmental organizations, advocacy groups, dissertations, and web-based resources. The review targeted the most recent literature (post-2000), but includes systematic literature reviews that cover earlier periods, as well as some often-cited pre-2000 works. The review supplemented findings from quantitative and qualitative studies with interviews of experts (both scholars and practitioners) in the fields of environmental psychology, architecture and design, urban planning, public health and early childhood education. A list of interviewees and questions asked is in Appendix 2.

Academic interviewees were selected if they were frequently cited in the literature or authored reports that were especially relevant. Interviewees in the field of design were selected based on their affiliations with reputable national or local (Wake County) organizations that work in this area. One local interviewee was referred by a member of the project team.

Findings

Interviewees and experts in the literature across diverse disciplines and occupations often echoed one another when providing recommendations for future projects. While the professionals and academics cited in this document provided specific guidance relating closest to their fields of specialization, they also shared a common understanding or agreement on aspects of implementation, summarized below, which can serve as a key takeaway for stakeholders and funders.

Access is a significant barrier to effectiveness. Access refers to the ability of children and families to interact with the space. Lack of adequate transportation options to and from the space is one example of a barrier to access. Spaces that fail to plan for children and families with disabilities also contain access challenges. The most effective use of resources would be to focus on spaces where children spend the most time, and places that they and/or their families frequent already. These places include schools, child care centers, and housing facilities.

Green spaces and natural settings play a vital role in fostering attention and energy restoration for children. Loss of regular contact with nature has adverse consequences for children, including increased risk of asthma and attention deficit hyperactivity disorder symptoms, as well as decreased ability to manage stress. Green spaces have a unique role

to play since they can be incorporated into different types of places (from hospitals to residential areas to schools) and offer a multitude of social and emotional benefits. All eleven interviewees touched on the positive impacts of natural spaces.

Community input and development is crucial. The most sustainable projects include community participation (e.g., from parents, neighbors, local leaders) and, ideally, children's participation in the design process. This way, stakeholders and children feel ownership over the space and mold the design to fit their unique situations. For example, involving teachers in the planning process of a schoolyard renovation will enhance the effectiveness of the renovation itself. The planning process will take teachers' needs and practices into consideration, thereby providing them with more effective resources that they will use to benefit children. The planning process will also give architects and planners a chance to bring new inspiration and practices to teachers. Teachers will be most likely to use these new practices effectively if they feel included in the planning. Furthermore, places change over time, and good process will equip the users of a space with the skills to adjust and redesign a space in response to evolving needs.

Similarly, **if an organization or leader is able to provide ongoing assistance to stakeholders after transformation, the space is more likely to be utilized to its maximum potential.** Providing users with guidance for how to best utilize the spaces will sustain their impacts. For example, installing an interactive staircase within a low-income housing development will be most effective if there is also programming to inform families about the positive impacts of physical activity with their children. Programming could also teach parents how to use the staircase to engage and play with their children. In this way, the design addition could bring parents and children together to explore and play in ways that best support children's development.

Improving spaces with an eye to both caregivers and children will maximize impact. Caregivers' mental health is correlated with children's mental health. Whether the caregiver is a guardian, teacher, or other adult, restoring his/her emotional health and enhancing his/her relationship with the child can provide lasting effects. For example, two-generation learning centers can provide counseling and parent education for families while at the same time providing a nurturing space for their children.

Limitations

While there is extensive literature pertaining to spaces' effects on children's physical health and cognitive development, there is significantly less research that focuses specifically on mental health or social emotional development. When mental health focused evidence was not available, the research team included studies on physical and cognitive development outcomes in this review, with the expectation that related connections might be drawn to mental health outcomes. It appears, however, that more research is needed in this area.

Similarly, some areas lacked research on very young children, focusing more on school-age youth. For example, the research on flipped classrooms focuses mainly on school-age children. Yet while the specific models studied may not be appropriate for younger children, some components of the models may be useful to keep in mind when designing for younger children. For example, designing for student-student interaction and student-student mentoring may be applicable across development levels.

Some areas lacked research on children altogether. For example, very little is published about the impact of urban planning and aesthetics on children's interactions with the environment. However, we include a section on urban planning in this review as it relates to the families of the children in which we are interested.

Furthermore, the questions being asked ("Does ___ affect children's mental health?") often do not lend themselves easily to gold standard statistical methods. The gold standard would be to conduct a study where children are randomly assigned to either treatment or control groups and outcomes are measured objectively. However, it would be expensive and logistically difficult to assign some children to low-nature environments and other children to high-

nature environments. It would be ethically inappropriate to assign some children to low-quality housing and others to high-quality housing. Furthermore, stress and mental health are difficult to measure objectively. One person's idea of a distressing event may be different than another person's. As such, much of the research reported in this review is descriptive or correlational rather than empirical or experimental. In these studies, researchers capitalize on situations that already exist and control for other factors that may bias the results. For example, Wells and Evans' 2003 study of the effect of nature on children's psychological stress included a control for family income because socioeconomic status also can impact children's mental health. The study also used multiple measures of psychological distress to make sure that the measurement results aligned with one another. Yet the study could not completely rule out the question of whether something else is driving the effect of nature on mental health. Without randomization, it is difficult to tell whether the effect can be wholly contributed to nature or if there are other factors at play. Thus, caution may be necessary to interpret the research results, recognizing that the results may not be generalizable to all children.

Conclusions

With regard to the intersection of mental health and spaces, there exist more unanswered questions than answers. Many of the answers lead to new questions. For example, many studies find that extensive noise exposure can adversely affect children's mental health. Other studies find no effect. Some find that the degree to which children are negatively affected by noise varies based on other factors like age, gender, and whether the noise is controllable. This in turn leads to questions such as, "What is the vehicle through which noise affects children's mental health? In building a space for children, what types of noise should we be worried about?"

In considering models for the John Rex Endowment's work in Wake County, interviewees and the literature agree that a space on its own has less effect on a young child than the relationships that occur within that space. Spaces that promote developmentally appropriate and compassionate relationships between caregivers and children will be more effective than spaces where caregivers stand passively on the sidelines.

Literature Review

Methodology

This literature review identified over 200 relevant sources from peer-reviewed journals, books, and reports from governmental organizations, advocacy groups, dissertations, and web-based resources. The review targeted the most recent literature (post-2000), but includes systematic literature reviews that cover earlier periods, as well as some often-cited pre-2000 works. The review supplemented findings from quantitative and qualitative studies with interviews of expert scholars and practitioners in the fields of environmental psychology, architecture and design, urban planning, public health and early childhood education. A list of interviewees and questions asked is in Appendix 2.

Findings

Findings Part I – Common Ambient Qualities of Spaces that Affect Children's Social Emotional Development

INDOOR AIR QUALITY AND INDOOR CLIMATE

Several studies have examined the effect of indoor air quality on children's health and educational outcomes (Evans 2006, Andrews & Neuroth 1988). One study of classroom ventilation rates in 54 elementary schools in one US school district found a significant association between classroom level ventilation rates and math test scores (Shaughnessy et al. 2006). Two possible mechanisms through which inadequate ventilation may have adverse effects on student performance are increased absenteeism or drowsiness (Sanoff 2007, Shaughnessy et al. 2006).

Temperature also plays an important role in task persistence and energy level among children. Children exposed to increasing levels of heat in well-controlled laboratory studies displayed decreased task persistence, especially as tasks involved more complex thinking (Evans 2006, Johansson 1975). Research confirms that air conditioning during warmer seasons positively affects student performance. Similarly, teachers report that students are more lethargic in warmer classroom settings (Evans 2006, Humphreys 1974, Pepler 1971)

INTERVIEW HIGHLIGHT | ***On the current state of research***

Most of the research that has been conducted looks at aspects of the physical environment that cause health problems rather than promote good health. – Professor Gary Evans, Cornell University (paraphrased)

TOXINS AND MOLD

Numerous studies have found compelling evidence that the presence of toxins, including lead, mercury, PCBs, and mold, influence the cognitive and social emotional development of children. Exposure to toxic elements in early childhood can lead to reductions in children's IQ, as well as defects in a wide range of developmental areas, including reaction time, visual-motor integration, hand eye coordination, memory, language development, attention span, and reading ability. This exposure can also cause increases in hyperactivity, impulsivity, aggression, and social withdrawal. For example, Mendelsohn et al. (1998) found that one- to three-year-olds with higher lead levels displayed lower tolerance for frustrating situations, even after including statistical controls for socioeconomic status. Some studies have found evidence that these negative consequences can persist into adulthood and may also impact educational outcomes, including high school graduation rates (Evans 2006, Hubbs-Tait et al. 2005, Koger et al 2005, Chiodo et

al 2004, Wigle 2003, Dietrich 2001, Bellinger & Adams 2001, Jacobson & Jacobson 2000, Grandjean et al. 1997, Spreen et al. 1984, Needleman 1979). Mold has also been shown to increase risk of asthma in children, the leading cause of absenteeism in school in the US (EPA 2010). The adverse consequences associated with these elements are worse in cases of poor ventilation (Evans 2006).

LIGHT AND COLOR

Exposure to natural light matters far more than the color palette used in interior design. According to Dr. Gary Evans, "despite widespread belief, there is no clear evidence that color affects mood, emotions, or psychological well-being in any systematic manner …. Levels of illumination, particularly the amount of daylight exposure, however, impact psychosocial well-being" (Higgins et al. 2005, Evans 2003, but see Read & Sugawara 1999 who find differentiation in wall color associated with increased levels of cooperation among preschool-aged children).

Both insufficient and excessive lighting have adverse effects on children. Prolonged insufficient exposure to natural light places children at increased risk of fatigue, distractibility, uncooperative social behavior, and depression (McColl and Veitch 2001, Kuller and Lindsten 1992). On the other end of the spectrum, excessive lighting (from too much daylight, artificial lighting, or glare) can cause headaches and impair visual learning. A 2008 study of 11 secondary schools in the UK found that 80 percent of the classrooms were too bright for the students' comfort. Problems cited included inadequate control of daylight (no blinds), use of outdated fluorescent lighting technology that resulted in an imperceptible flicker, and glare on the whiteboard from projectors (Winterbottom and Wilkins 2008).

NOISE

The most often cited sources of noise exposure for children are transportation traffic, especially from aircraft, music, and other people (Evans 2006). Studies of children's exposure to traffic noise from roads, trains, and the opening of a new airport, have found that increased exposure places children at higher risk of poorer mental health (Lercher et al. 2002, Bullinger et al 1999). Some studies have found that prolonged exposure to noise, even at a level insufficient to cause hearing loss, is associated with adverse effects on reading level (Evans & Maxwell 1997, Evans & Hygge 2005), long-term memory (Stansfeld et al. 2005, Hiramatsu et al. 2004, Haines et al 2001), speech perception (Evans & Hygge 2007), attention (Smith & Jones 1992), and hyperactivity (Stansfeld et al 2004). Some studies of adults, not replicated for children, have also found that noise increases levels of annoyance and aggression, and decreases persistence in activities as well as the likelihood of prosocial behaviors (Cohen & Sapacapan 1984, Glass & Singer 1972). Uncontrollable noise has also been associated with learned helplessness (Evans & Stecker, 2004).

The degree to which children are negatively affected by noise may depend on age (older children may suffer more adverse effects) (FICAN 2004, Bronzaft 1981), gender (Wachs 1978), duration of the exposure (Cohen 1986), the degree to which the noise is uncontrollable (Cohen et al. 1986), prematurity, and the presence of pre-existing developmental delays. Chronic noise exposure may also have a detrimental effect on adult-child interactions, resulting in adults who are more fatigued and less responsive to children (Evans 2006).

CROWDING

Crowding is measured by the number of people per room (Evans 2006, Evans 2001). There appears to be a developing consensus in the literature that crowding can lead to social withdrawal among young children (Evans 2006, Liddel & Kruger 1987, 1989), as well as teenagers (Evans et al 1998). Studies have found that, in crowded places, adults (e.g., parents, teachers) are less responsive to children, monitor children's behavior less frequently, talk less with young children and use less complicated forms of vocabulary, and rely on more punitive forms of punishment; families experience more stressful, strained relationships in the home; and children experience increased

levels of off-task time, distress, aggression, and feelings of helplessness, and decreased levels of cooperation, constructive play, persistence, social emotional competency, and academic achievement. In congested hallways or classrooms where ease of movement is constricted, children can also experience increased anxiety and tension (Sanoff 2007). In resource-rich environments, some of the negative effects of crowding may be partially mitigated. Children who experience crowding in multiple environments (e.g., both at home and at school) are at increased risk of greater adverse mental health outcomes (Evans 2006, Evans at al. 2002).

ART

There is evidence that experiences in the arts lead to enhanced social and emotional development as well as improved mental health (Upitis, 2011). Studies show that arts learning fosters cooperative, focused behavior, problem-solving, and self-confidence (Jensen, 2001). Arts learning also can develop a sense of connections with others (Davis, 2008; Noddings, 1992). Studies also show a positive relationship between studies in the arts and benefits for at-risk students (Flohr, 2010), including decreased risk of violent behavior and significant improvements in self-esteem (Respress and Lufti, 2006). Arts learning can take place through intra-curricular (learning in, about, and through the arts), extra-curricular (such as school musicals), and community and school-based arts partnerships. The physical environment can promote arts learning through inclusion of specific spaces to be used for that purpose.

Integrating children's art into places and spaces is another way to increase their ownership over a space, and possibly their self-esteem. When children in an elementary school created artwork that was permanently displayed in their school, they demonstrated a higher sense of school ownership than peers in a school that did not incorporate such artwork and participation (Killeen et al., 2003). Another study produced mixed results on the relationship between displayed student artwork and self-esteem. When the physical environment permitted children to get their own supplies, provided them with a task-appropriate work space, and was personalized to permit children to observe aspects of themselves in the environment (artwork, mirrors, photographs), some were more likely to complete tasks and therefore have a sense of competence and accomplishment.

Expressive arts therapy may promote psychological health and social support for vulnerable children. Expressive arts include activities such as dancing, drawing, drama, creative writing, painting, writing poetry, making music, sculpting, and photography (Phelps 2014). When children engage in expressive arts, their breathing slows, their blood pressure lowers, and the body becomes more relaxed (Lane, 2005). This helps reduce the fight-or-flight response associated with stress. Working with small groups in the expressive arts integrates peers in the process, cultivating social interaction, mutual support, peer modeling, and empathy development (Cumming & Visser, 2009). According to Carr (2009), the evidence base for art therapy is currently quite small and few randomized trials have been conducted. However, some controlled trials show positive impacts for art therapy. Chapman et al. (2001) found that pediatric trauma patients who received art therapy displayed a greater reduction in acute stress symptoms then those who received traditional hospital treatment.

Findings Part II – Places and Spaces Children Frequent Most Often and the Impact of These Spaces on Children's Social Emotional Development

GREEN SPACES, PLAYGROUNDS, PARKS, OUTDOOR SETTINGS, AND NATURAL ENVIRONMENTS

Built environments can help children experience nature more fully, a need that has become more pronounced in an age where children have become increasingly isolated from the natural world (Wendell et al. 2008). Loss of regular contact with nature has adverse consequences for children (Louv 2005), including increased risk of asthma and

attention deficit hyperactivity disorder symptoms (Kuo and Taylor 2004, Taylor et al. 2001), and decreased ability to manage stress (Wells and Evans 2003).

Green spaces and natural settings play a vital role in fostering attention restoration (Kaplan & Kaplan, 1989). The need for and benefit of restoration are well documented and tested (Interview with Taylor). Children and adults increasingly live in attention-fatiguing environments that place heavy demands on the need to focus on certain information and filter or suppress distracting stimuli, an ability researchers call "directed attention" (Berman et al 2008). Excessive fatigue impairs the ability of children to focus attention, regulate behavior and exercise judgment, and leads to increased irritability (Kaplan 1995). While there is less research around the impact on children, there is reason to believe that they may experience increased levels of fatigue since they are not born with fully functioning capacities (Interview with Taylor).

FROM THE LITERATURE | *On the cognitive benefits of natural environments*

"Nature, which is filled with intriguing stimuli, modestly grabs attention in a bottom-up fashion, allowing top-down directed-attention abilities a chance to replenish. Unlike natural environments, urban environments are filled with stimulation that captures attention dramatically and additionally requires directed attention (e.g., to avoid being hit by a car), making them less restorative." – Berman, M. G., Jonides, J., & Kaplan, S. (2008)

Landmark work on attention restoration theory (ART) identified four characteristics that promote restoration (Kaplan 1995). Experiences and environments reduce fatigue when they foster fascination, offer the opportunity to get away (what Kaplan refers to as "being away"), are "rich enough and coherent enough so that they constitute whole other worlds," and are compatible with "one's purposes and inclinations" (Kaplan 1995). It is not necessary to have all four characteristics, but green spaces do, which makes them especially effective (interview with Taylor, Kaplan 1995).

Both time in green spaces and views of green spaces have been found to have positive benefits for children (interview with Taylor) that include improved memory (Berman et al. 2008, Jonides et al. 2008) and educational outcomes. For example, one study compared 200 high schools and the views students had from classrooms and cafeterias. The study found that students performed better when they were enrolled in schools that provided views of green spaces from the cafeteria. The benefit of views of green spaces from the cafeteria, but not the classroom, supports the theory of attention restoration (interview with Taylor). Additional research has found that walking in nature improves attention-directed abilities of children in poor urban environments (Berman et al. 2008), and that increasing the richness of a green space is associated with decreases in the severity attention deficit symptoms (Taylor et al 2001).

Children growing up in the inner city are often at increased risk of negative developmental outcomes as a result of living in areas barren of rich green space. A study of the vegetation level of 64 public housing complexes in one city observed that children residing in more barren areas of low vegetation were significantly less likely both to engage in creative play and to play in the presence of adults than were children who lived in areas with more abundant green spaces (Taylor et al. 1998). Studies have also found that even small additions to quantity and quality of green spaces can result in positive outcomes for children (interview with Taylor).

Wells and Evans' 2003 study of 337 children living in rural New York demonstrated that exposure to nature actually moderates the impact of stressful life events on the psychological well-being of children. The study examined the impact of stress on children living in low- and high-nature settings, as measured by a scale with four items that evaluated the amount of nature in the window view, the number of live plants indoors, and the material of the outdoor yard. Children in high-nature settings exhibited less psychological distress (e.g., emotional and behavioral problems as reported by their parents and global self-worth self-reported by the child) in response to stressful life events than their low-nature counterparts. The researchers found this significant difference above and beyond the effects of socioeconomic status (that is, the differences in the effects of nature on children's psychological outcomes

are not due to family income). The mechanism through which nature affects mental health is unclear, though Wells and Evans suggest the possibility of attention restoration and social support (nature drawing children together to create supportive friendships).

Unstructured play supported by green spaces is critical to social development (Interview with Taylor, Wendell et al 2008, Ginsburg 2007). Play in green spaces facilitates development by encouraging more conversation and negotiation, as children are required to "create their own rules, manage their own projects and spend time learning in a self-directed manner about the world around them" (Wendell et al. 2008). Additionally, the more time children spend engaged in activities in green spaces, the stronger the benefits (Evans 2006, Hattie et al. 1997).

A key aspect to designing effective outdoor spaces for children is the provision of a wide selection of ways of engaging with the environment. Outdoor spaces with multiple natural and manufactured offerings engage in a more complex and diverse array of motoric, social, cognitive and creative play (Cosco & Moore 2009).

While numerous health and developmental benefits are associated with green spaces, they are insufficient without adult-child interactions (Interview with Taylor). Even when there are green spaces, it is important for parents and other adults to interact more with children in those spaces.

Additionally, adults can benefit from restorative environments, too. These benefits include increasing attentiveness to their children or students.

INTERVIEW HIGHLIGHT | ***On the importance of green spaces***

Green spaces help children be their best. In that respect they are absolutely necessary, though not sufficient, to promoting children's social emotional development. – Andrea Faber Taylor, University of Illinois

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HOUSING

Housing Type. Evans' 2006 literature review of child development and the physical environment divided research on the link between housing and children's development into four major sub-categories: housing type, housing quality, structure and predictability of daily routines, and residential mobility (Evans 2006). Studies have found that, controlling for income, living in high-rise buildings (especially on upper floors) and in neighborhoods with a high concentration of multi-dwelling units is associated with adverse outcomes for children and youth. Adverse outcomes include increased incidence of behavioral problems, more restricted play, and poorer physical health (Evans 2006, Wells 2000, Taylor et al. 1998, Saegert 1982, Ineichen & Hooper 1974, Richman 1977, Gillis 1974). A possible mechanism driving the adverse outcomes in high-rise buildings is lack of access to outdoor spaces or views of green spaces (Taylor et al 1998, Coley et al. 1997, Sullivan and Kuo 1996).

Housing Quality. According to Evans' 2006 review, studies have linked poor housing quality to numerous adverse outcomes for children, including increased psychological distress (Gifford and Lacombe 2004, but see Greenberg et al. 1999), impaired cognitive and social development, impaired memory, and lower test scores (Greenberg et al. 1999, Obasanjo 1998, Michelson 1968, Wilner et al. 1962). These associations also have been shown to increase in strength and severity with duration of exposure (Evans 2006). Research points to multiple mechanisms through which poor housing quality may affect children, including strains on interpersonal relationships either between parents or between parents and children (Edwards et al. 1982, Moore 1975), decreases in the prevalence of social support networks (Evans et al. 2003, Obasanjo 1998), and increases in sickness that lead to higher rates of school absenteeism (Shaw 2004).

Structure and Routine. Lack of regularity and predictability within the home, a dynamic referred to by some scholars as chaos (Evans 2006), is associated with more behavioral problems, poorer educational outcomes (Brody & Flor

1997, Guidubaldi et al. 1986), more emotional distress (Evans et al. 2005), and less ability to self-regulate (Brody & Flor 1997). When children from chaotic homes enter adolescence, they are more likely to engage in riskier health behaviors (Fisher & Feldman 1998). Additionally, in households with less structure, parents interact with and monitor children with less frequency, both critical to children's social emotional and cognitive development. Finally, lack of structure and routine are often closely associated with increased mobility (frequency of moves), which research has found negatively affects children's ability to thrive (Adam 2004).

NEIGHBORHOODS AND URBAN ENVIRONMENTS

Many of the factors in places mentioned above, including noise, toxins, crowding, green spaces, and housing type and quality, are also important contributors to the impact of neighborhoods on children's health and development. City planners play a crucial role in terms of the overall design and regulation of neighborhoods. Planners' roles include determining zoning, mixed use development, traffic flow, public transportation, recreational opportunities and green spaces, sidewalks and bike lanes, and the geographic distribution of retail, education, and health services (Evans 2006). In planning neighborhood or urban environments for children, advocates suggest two key principles: 1) planning *for* children, which includes taking into consideration factors such as safety, availability of green space, and accessibility to necessary services and spaces; and 2) planning *with* children (McAllister 2008).

Safety and Surveillance. Studies demonstrate that perceptions of safety influence the extent to which people use spaces. For example, living near busy roads with heavy traffic patterns raises the risk of pedestrian injury and fatality among children. In response, parents are more likely to place restrictions on children's outdoor play, which inadvertently results in decreased development of motor and social emotional skills. Design that reduces crime can also enhance the mental and social well-being of children and may also increase social interaction among neighbors, resulting in less isolated, more socially supportive families (Planning Institute of Australia 2009).

Aesthetics. The attractiveness of a place or area affects the overall experience and use of a place. An attractive neighborhood invites people to use and enjoy its public spaces and to feel safe (Planning Institute of Australia 2009). Enhancing the aesthetics of a space makes it safer, and therefore increases access through it for pedestrians and cyclists. Aesthetics may not have a direct impact on children's mental health, but enhancing the attractiveness of a space increases access to restorative places for the most vulnerable children. Design strategies for promoting livable spaces include providing seating, shade, shelter, public toilets, bike racks, play equipment and green spaces. Small improvements can make a difference. For example, one study found that the presence of trees and vegetation in outdoor public spaces increased use of these spaces by both youth and adult residents (Interview with Taylor, Coley et al. 1997).

Green Space. Planners and neighborhood associations should advocate for reserving land for passive and active recreational uses that includes parks, open spaces, and proximal nature. Strategies include preserving natural environments, establishing conservation areas, adopting appropriate policies for urban storm-water management, creating bird sanctuaries and other natural settings around fields and creeks to promote interaction with wildlife, and establishing community gardens, central parks, and arboretums (Interviews with Lisa Tolley and Monica Pallett).

Access. Active transportation and mixed land use are two principal means whereby planners can increase accessibility of services and spaces to low-income families. Urban environments should be designed to promote multiple travel modes, including walking and cycling, and use of public transport. Strategies include creating footpaths with lighting, water fountains, and clear signage; bike paths with bike racks and lockers, signs and showers; and public transportation with safe shelter, lighting and signs (Planning Institute of Australia 2009). Mixed use, which co-locates complementary places, such as houses, shops, schools, offices, libraries, open space and cafes, promotes active transport to and between different activities. People are more likely to walk, cycle, or take public transport when they can conveniently undertake multiple activities at one destination. Additionally, active transport and mixed land use increase a sense of belonging and perceptions of safety, and decreases feelings of isolation (McKoy et al. 2011).

SCHOOLS AND CHILD CARE CENTERS

A sizeable portion of the literature examining the relationship between places and children's social emotional development focuses on learning spaces, including child care centers and schools. Research has found that children's cognitive, social, and emotional well-being are affected by the quality of learning spaces as measured by "size, density, privacy, well-defined activity setting, modified open-plan space, a variety of technical design features, and the quality of outdoor spaces" (Moore 2007, Evans 2006, Lackney 2005, see also Moore 1987), as well as various ambient qualities described in Part I of this section (e.g., air quality, lighting, noise).

Size and Density. Some studies have found developmental benefits associated with smaller schools and child care centers, and these benefits may be more pronounced for children from low-income households (Howley et al. 2000, Cotton 1996). While formal child care centers (compared to child care homes) provide children, on average, with more activities to encourage exploration and the development of motoric and social skills, a growing body of evidence suggests smaller centers provide higher quality early learning experiences (Moore 2007). Young children in smaller centers display more verbal initiative and reflective behavior (Travers & Ruopp 1979). Smaller schools are associated with improved educational outcomes (Howley et al. 2000), student behavior, attendance, involvement in extracurricular activities, and rates of students self-reporting a sense of ownership and belonging (Cotton 1996). Studies also find increased likelihood of parental involvement in smaller schools (Schneider 2002). Children in crowded learning environments are more likely to display aggression, social withdrawal, and hyperactivity, and express feelings of being tired, overwhelmed, or unhappy (Maxwell 1996, Lowry 1993).

Classroom Design. Beginning in the 1970s, some schools began to experiment with open-plan design, which featured few floor-to-ceiling walls. This contrasts the traditional classroom, which architects and designers describes as a "box" with a teacher positioned in front of students aligned in rows of desks. Evidence on the benefits of the first wave of open-plan design has been mixed at best. Studies have found little to no change in academic achievement indicators between the two types of learning spaces (Evans 2006, Gifford 2002). Children in open-plan spaces must also contend with more noise, distraction, and off-task time and the corresponding developmental challenges that accompany these factors (see part I above) (Evans 2006, Lackney 2004, Olds 2001, Moore 1986, Cotterell 1984, Kyzar 1977). Surprisingly, open spaces also suffer from problems with density and cramped spaces as researchers have noted children's propensity to cluster in certain areas, leaving others underutilized (Evan 2006, Sanoff 1995, Moore & Lackney 1993, Rivlin & Rothenberg 1976).

Modified open-plan designs that more clearly demarcate spaces for specific activities and provide secluded spaces for privacy or quiet reflection and individual work have been shown to mitigate some of the challenges presented by open spaces and increase comfort (Evans 2006, Olds 2001, Moore & Lackney 1993, Grenman 1988). Studies have found that younger children especially may prefer more enclosed spaces (Evans 2006, Ahrentzen & Evans 1984).

Finally, multiple studies and experts interviewed as a part of this review commented on the importance of making learning spaces more homelike. The transition from home to school can be stressful for very young children, as the institutions have very different cultures and physical dimensions. Incorporating physical and social home-like characteristics into the institutional setting may reduce anxiety for both parent and child (Lackney 2000). There is also evidence that more child-friendly classrooms are related to higher levels of voluntary participation and that overall aesthetic quality in educational facilities is related to students' task persistence (Lackney 2000). Strategies for making a classroom more homelike and less institutional include introducing niches and enclosures for privacy, appropriate lighting, soft furniture and flooring materials, and color and student artwork (Evans 2006, Lackney 2004, Sanoff 1995, Moore & Lackney 1993). Signaling the need for improvement, Higgins et al. note that "much of what is known about student comfort, particularly in terms of furniture, has yet to be translated into actual school environments" (Higgins et al. 2005).

More recently, some architects and educators have begun advocating styles of teaching and learning that embrace multiple learning styles and sensory modalities. The design studio model and the flipped classroom model are examples that demonstrate how spaces and curricula work together and how spaces can either complement an instructional style or hinder it. In the design studio model, classrooms are more akin to workshops than to traditional classrooms, with learning spaces characterized by different activity settings geared toward small groups. Students engage team problem solving, peer review, and experimentation in a highly interdisciplinary environment, where teachers function more as mentors than instructors (Interview with Taylor). The flipped classroom uses spaces similarly, though with more focus on student discussion and interaction in teams. Though there is little robust quantitative evidence that these models of classrooms affect students' mental health, some test classrooms have compared favorably to control classrooms. For example, in one New York elementary school, a flipped classroom resulted in significantly fewer disciplinary problems among the students both in-class and at home (Ogurek 2010). Second grade students in the flipped classrooms exhibited increased self-confidence and focus (Ogurek 2010). Little research on these models has been conducted with young children, but similar concepts are used in early childhood settings (e.g., learning centers, small group work) and may have similar social emotional outcomes for children.

Children's preferences for and responses to classroom design are not uniform. A 1990 study found that children (in kindergarten and first grade) expressed different preferences for color, shape, light, and complexity and diversity of stimuli, and that some of these differences were associated with gender (Cohen & Trostle 1990). Additionally, children with a history of lower persistence and academic achievement, and children who are English language learners, perform poorer, on average, in open-plan classrooms (Evans 2006). Given the different needs of students and the fact that certain arrangements are better for certain activities, experts agree that classrooms should have some degree of flexibility (although they may not agree on the best overall design) (Higgins et al. 2005).

While children display variation in the way they respond to certain classroom configurations or designs, they exhibit more uniform responses to uncleanliness and structural disrepair. Such environments are associated with increased absenteeism and, among older youth, dropout rates (Branham 2004). There is growing consensus that significant benefits for children can be realized by bringing poor quality spaces up to a base level of adequacy. Additional gains can be realized, but the size of benefit is less clear (Price Waterhouse 2007).

Finally, new ideas are constantly emerging. For example, in 2006, the Mayo Clinic released what they called the first chairless classroom that included, among other features, standing desks (Mayo Clinic 2006). While numerous new ideas have emerged around the best way to redesign the 21st century classroom, schools have been slow to adopt them. Some experts interviewed as part of this review lamented this fact, commenting on how little the typical American classroom has changed since the industrial revolution, when schools were designed as educational factories (see Interview with Taylor). Expressing a similar sentiment, one NC State professor commented, "Teaching methods have changed, but, often, the design of the classroom has remained static."

School Design Patterns. Much of the research on school design patterns uses academic achievement as the dependent variable instead of children's mental health. For example, a 2008 descriptive study analyzed the role of four key factors of the physical environment and layout of elementary schools: movement and circulation (the ease with which students can move throughout a space), gathering places for large groups, natural lighting and views, and areas that accommodate a diverse array of small group activities (Tanner 2008). The study found that each of the four design elements was positively related to academic achievement. A study by the same researcher found that students performed better in schools with carpeted, soft floors as opposed to hard floors (Tanner & Langford 2003).

In 2009, a team of researchers embarked on an instrumental case study design that, drawing on the perceptions and experiences of children, examined the importance of the physical environment for student outcomes. Researchers collected students' observations of the places children found most supportive using focus groups and equipping students with cameras to document the spaces. Researchers found broad consensus among the students relating to

places they identified as supportive learning environments. Key elements noted by students included ease of movement, aesthetics or the attractiveness of a space, lighting, flexible and responsive classrooms, elbow room, and security (Uline et al. 2009). These elements were associated with an increased sense of belonging and ownership, and greater feelings of competence and self-control.

FROM THE LITERATURE | *On the current state of research*

"Although the research often indicates the parameters of an effective environment, there is an overall lack of empirical evidence about the impact of individual elements of the physical environment which might inform school design at a practical level to support student achievement. However, at a secondary level of analysis, there are indications that environmental change can be part of a catalytic process of school development and improvement." – Woolner et al. 2007

Playgrounds and Schoolyards. Outside of the home environment, students spend most of their waking hours in schools or child care facilities. Given the important role green spaces and outdoor areas play in the development of children (see section on Green Spaces), and the lack of access to quality green spaces for some children who may benefit the most from such places, experts argue that it is critical to ensure schools and learning spaces provide access to rich natural settings, adventure playgrounds, and green spaces that invite complex and imaginative play (see interviews of Cosco, Evans, Faber Taylor, Taylor).

Play is crucial for children's physical, social, and emotional development. According to Ginsburg (2007), "As they master their world, play helps children develop new competencies that lead to enhanced confidence and the resiliency they will need to face future challenges. Undirected play allows children to learn how to work in groups, to share, to negotiate, to resolve conflicts, and to learn self-advocacy skills." Research shows that playgrounds and schoolyards are integral to bringing play into the academic environment. Utilization of these spaces has been shown to help children adjust to the school setting and even to enhance children's learning readiness, learning behaviors, and problem-solving skills (Ginsburg 2007). Including caregivers in play is also a unique opportunity to build positive bonds between children and adults that have many stresses in their lives. Yet some physical characteristics of playgrounds aid in development more than others.

Experts in the field recommend that one of the most important characteristics of a quality outdoor environment is the richness of the space, defined by a combination of manufactured and natural environments. Specific recommended elements include, in addition to the more traditional features of a playground like slides and swings, "gardens, vegetable gardens, butterfly gardens, stimulus shelters, natural and wild places," as well as "loose parts (portable materials), such as blocks and construction materials, tricycles, and water play materials" (Frost 2004). Several experts also lamented a culture in which excessive concerns for safety, often prompted by fears of litigation, have made it more difficult for children to explore and play in a way that best support a child's development (Cosco, Evans, Shapiro). Schoolyards situated in low-income communities that feature rich green spaces and play areas can increase access for nearby residents and children by functioning as co-located public parks or recreation areas that invite community use (interview with Cosco).

HEALTH CARE FACILITIES

A 2013 literature review of physical environmental factors in health care facilities that contribute to well-being and health reviewed 209 publications, including peer reviewed articles, guidelines, books, and reports (Salonen et al. 2013). Researchers found evidence that the following elements, in addition to safety, promote health and well-being: ventilation, heating and air conditioning, acoustic environment, interior layout and room type, daylight and views, access to green spaces and gardens, lighting, color, floor coverings, furniture, ease of movement and clear signage,

artwork and music. The effects of these elements ranged from directly promoting health to indirectly promoting well-being via improved behavior, attitudes, and social interactions.

In a 2004 literature review, researchers from Texas A&M and Georgia Tech identified more than 600 studies, most in the top peer-reviewed journals, that examined a similar topic concerning the relationship between health and a hospital's physical environment (Ulrich et al. 2004). They concluded that there was compelling evidence that a wide array of design aspects contribute to the well-being of patients (with no particular focus on children), and also that most hospitals were not aligned with these best practices. They identified the following key strategies: reducing noise, improving way-finding and access to natural lighting, increasing interaction with nature, music, art, and animals, and promoting social interaction to make it easier for families to support their loved ones.

Reduce Noise. Noise is the leading cause of sleep loss and distress in hospital settings, for both adults and children. Key interventions include moving from multi-bed to single-bed rooms (noise from another patient was found to be main source of noise; see Southwell & Wistow 1995, Couper et al. 1994), installing sound-absorbing ceiling tiles and flooring, and eliminating unnecessary noise within rooms from sources like patient alarms (Ulrich et al. 2004). In addition to increasing noise, multi-bed rooms have also been found to reduce the likelihood of social interaction, including family presence, and increase levels of stress.

Improve Way-Finding. Similar to findings in some studies of public schools, the inability to easily navigate a space causes distress. Within a hospital setting, which has many more visitors than a public school, the costs associated with poor way-finding is much higher, and occurs mainly in the form of staff time spent directing people who are lost (Zimring, 1990). Improving and increasing signage and ensuring directions are clear results in lower stress levels (Ulrich et al. 2004).

Improve Lighting, Increasing Natural Lighting and Access to Window Views. Several studies have found that more natural lighting increases the speed of recovery and reduces symptoms of depression. Benefits also extend to brighter artificial lighting (Ulrich et al 2004). There are additional benefits to the presence of windows and the views they provide (Rubin & Owens 1996, Verderber et al 1987, Ulrich 1984, Verderber 1982, 1986).

Increase Access to Restorative Activities. Some activities have been found to be especially effective at restoring patients who are attention-fatigued and distressed. Access to nature and gardens is the most effective strategy. Interactions with nature can be brief and still reduce stress and increase a patient's sense of control. Hospital gardens, in addition to reducing stress, have an added benefit of promoting social interaction (Ulrich et al 2004). Additional restoring activities include interacting with animals, listening to music, viewing art, and laughing (Devlin et al. 2003, Ulrich 1991).

Additional research has found evidence to support the following design elements: 1) homelike environments (Devlin et al. 2003); 2) smaller inpatient clusters that increase a feeling of belonging as well as satisfaction among staff (Shepley 2013); 3) richer spaces that are also flexible in terms of arrangement (Shepley 2013).

PARTICIPATION, SUSTAINABLE IMPACT, AND PROFESSIONAL DEVELOPMENT

There is a growing body of research that points to the importance of involving key stakeholders and users of a space in the design process, including young children, parents, teachers, and neighbors (Blackmore et al. 2010, Burke 2007, Woolner et al. 2007, Higgins et al 2005, Burke & Grosvenor 2003, Clark et al. 2003). Different users often have different perceptions and needs from one another, which also tend to differ from those of the architect or designer (Higgins et al. 2005). Soliciting child and parent input in the process promotes local variation and ownership of a place, fosters a sense of belonging, enhances self-efficacy and agency, and helps sustain the intended impact of a space (Blackmore et al 2010, Higgins et al. 2005). In school or child care settings, involving teachers is also critical as their buy-in, satisfaction and attitude toward the space will play vital roles (interview with Shapiro, Higgins et al. 2005).

Spaces and places likely need to change over time, and good process will equip the users of a space with the skills to adjust and redesign a space in response to evolving needs. One strategy practitioners have found especially effective is involving users of space in the design process from the start of a project through its completion.

INTERVIEW SNAPSHOT | *Participatory design in practice*

Nilda Cosco, Director of Programs at NC State's Natural Learning Initiative, described a process they have used in working with child care centers on redesigning spaces. The process begins with design experts working directly with teachers and staff members to develop ideas for the new space over two days. This step includes a component that equips teachers with the necessary skills to engage their students in the design process, too. Designers survey parents, and then take all the information they have gathered and prepare a design program, which participants review and revise. Finally, the design team works with staff members to prioritize design phases based on each site's budget, and participants develop an action plan for completion of the work. – Nilda Cosco, 2014 interview

New or re-designed buildings alone are insufficient to promote the positive social emotional development of children. In order to fully realize the benefits of developmentally appropriate design, teachers and parents must be equipped with an understanding of the space, and the skills and pedagogy necessary to use it. In educational settings, the complementary role of professional development to the design of new spaces is often overlooked or undervalued (Blackmore et al. 2010). "Unless teachers are prepared and provided with necessary professional skills, tools, and resources to change their practices," comments Blackmore et al., "then new built spaces will not move them from default to innovative pedagogies." Supporting this claim, research has found, for example, that children perform better in open-plan classrooms when their teacher is comfortable with and has experience teaching in an open-plan classroom versus a traditional closed classroom (Gump 1987).

ACCESSIBILITY OF PLACES AND SPACES

When planning for accessibility, at least two dimensions of access stand out as important considerations: access of transport (can children get to the place?) and access of use (can children with a broad range of abilities use the space?). Transportation surfaced as one of the main barriers of access in Wake County (interview with Lisa Tolley). One way to overcome this issue is to target spaces that children's parents tend to frequent (e.g., pediatricians' offices, public transportation, churches) (interview with Kyle Snow). Another way is to bring spaces to children. For example, the Wake County program Read and Feed is a mobile classroom in a large bus that brings reading tutors and meals to low-income children's neighborhoods.

The principles of universal design address access of use concerns. According to the principles, "rather than designing your facility for the average user, you design them for people with a broad range of abilities and other characteristics" (Burgstahler 2009). Built on the values of inclusion, the principles require proactive planning and careful consideration of the users of a space and their unique and diverse needs. Designing for use means designing with the goal that all users feel welcome, can access and move within the space with ease, can participate in all activities, and can make use of the variety of spaces and equipment within the space (Burgstahler 2009). Involving potential users of a space in the design process can help identify needs that may otherwise go unaddressed.

Interviews

Methodology

We conducted interviews with scholars and practitioners from across the country in the fields of environmental psychology, architecture and landscaping, child development, and public health. Academic interviewees were selected if they were frequently cited in the literature or authored particularly relevant reports. Interviewees in the field of design were selected based on their affiliations with reputable national or local (Wake County) organizations that focus on the goals concerning children's mental health and the role of places and spaces. One local interviewee was referred by a member of the research team.

The conversations are documented below. Note that interviewers typed notes while listening to the respondent, but the interviews were not transcribed word for word. Please see Appendix 2 for a list of individuals interviewed, additional prospects with whom we considered speaking, and a list of questions we used as general framework for the interviews.

Patrick Brosnan

President, America's Schoolhouse Council and CEO, Legat Architects

Robin Randall

Vice President and Director K-12 Education, Legat Architects

Interview Date: June 11, 2014

Background

Patrick Brosnan is the President of America's Schoolhouse Council, a collaborative of nine design firms across the country. The goal of the collaborative is to learn from one another about innovative best practices in design for children. Patrick is also CEO of Legat Architects. The firm takes seriously the question of how a child's environment shapes the learning experience, a commitment demonstrated by the fact that Legat funds and conducts its own research on the topic.

Robin Randall is an architect, educator, and environmentalist. She works with Legat Architects as Director of K-12 Education. She leads client development, planning, and design across the practice. An expert in sustainable school design, Robin has researched indoor and outdoor learning environments that support curricula and communities.

What factors or elements of the physical and social environments in children's places and spaces have the greatest potential to influence the positive mental health of children?

Randall described a site designed for a Montessori client, Seton Montessori in Clarendon Hills, IL. One of the project's unique aspects was the way it involved children and parents in the design process. The architects met first with the children who described the kind of space they wanted to learn in (this included a tree house). The designers then met with parents to further refine the idea, and finally with program staff to understand the type of environment they wanted to work in and to determine what type of work was feasible from a budgetary standpoint. More information at: http://setonmontessori.org/school/environment/preprimary-classrooms/

Randall also spoke about the importance of using environments to teach sustainability, and described the "living laboratory" they created at the Montessori School.

Brosnan added that their emphasis is on understanding how buildings teach. Buildings are not simply the place where instruction occurs.

Randall also referenced an article she prepared on the value of the outdoor classroom (see Randall in Appendix 1), and spoke about the "economics of biophilia." Biophilia refers to the innate human attraction to nature. The economics of biophilia refer to the small investments designers can make in nature-inclusive designs that reap large rewards in the long-term. For example, a hospital can save money in the long run by designing rooms to have nature views. Patients will heal faster, allowing hospitals to turn over beds and rooms more quickly. Much of Randall and Brosnan's design work places emphasis on nature-based learning and integrating nature in the classroom.

Brosnan spoke about one of their design projects that served a population of children with special needs. A majority of children in the child care facility had Individual Education Plans. He spoke about the importance of lighting in that setting and minimizing the amount of distractions. Randall added that lighting is important and that lighting needs vary widely from setting to setting. She referenced a particular case in which students were interviewed and said they had too much light in the school. The real problem was glare, which the students misinterpreted.

If you were advising a philanthropic endowment with limited financial resources on the best strategy for transforming local spaces and places to promote the positive mental health of children, especially children from vulnerable populations:

What kinds of places and spaces and quality improvements would you recommend it focus on?

One of the most important aspects of design principles for children is diversity of space. Children are diverse learners and the old model of education "in a box" is not best for children's development.

Learning environments should provide naturalistic learning experiences, security, a feeling of home, and areas for curiosity. They also placed emphasis on outdoor enclosed play spaces (open spaces within a building, like a courtyard area), and sensory gardens.

As part of this project, we plan to conduct case studies that examine places that have successfully promoted the mental health of children. Can you identify a few specific places and spaces that are especially effective at promoting children's positive mental health?

They recommended following one of their projects from the development phase to completion and assessing the degree to which the space met the needs of the children.

Are there particular resources that I should be aware of?

- Peter Lippman, author of Evidence-Based Design of Elementary and Secondary Schools. Read an interview with Mr. Lippman here: http://holtthink.tumblr.com/post/76395390247/interview-with-peter-c-lippman-author-of
- Dr. Cynthia Uline, Director of the National Center for the Twenty-First Century Schoolhouse, San Diego State University, http://coe.sdsu.edu/edl/schoolhouse/planning/design.php

Nilda Cosco

Research Associate Professor
Director of Programs for the Natural Learning Initiative
North Carolina State University
Interview Date: June 19, 2014

Background

The purpose of the Natural Learning Initiative is to promote the importance of the natural environment in the daily experience of all children, through environmental design, action research, education, and dissemination of information.

If you were advising a philanthropic endowment with limited financial resources on the best strategy for transforming local spaces and places to promote the positive mental health of children, especially children from vulnerable populations:

What kinds of places and spaces would you recommend it focus on?

Spend money on the places where children are. Children may not often visit the park. I would say choose the spaces that children visit daily. For example, public housing.

Increase the quality of the environment and human context for people to enjoy. Here we are talking about places where intergenerational aspects are fundamental.

Improve quality of the natural environment even eating spaces, with gardens. Small interventions are possible. Maybe a full community garden is overwhelming. Shade to prevent skin cancer.

Establish a community participation process. It will not be sustainable without this.

As part of this project, we plan to conduct case studies that examine places that have successfully promoted the mental health of children. Can you identify a few specific places and spaces that are especially effective at promoting children's positive mental health?

Cosco and others at the College of Design are currently working with multiple child care centers in and around Wake County. She spoke about the process they use to involve children and adults in the design process.

The process begins with design experts working directly with teachers and staff members to develop ideas for the new space over two days. This step includes a component that equips teachers with the necessary skills to engage their students in the design process, too. Designers survey parents, and then take all the information they have gathered and prepare a design program, which participants review and revise. Finally, the design team works with staff members to prioritize design phases based on each site's budget, and participants develop an action plan for how the work will be completed.

Cosco stressed the importance of training people who are the conduit on how to use, install, and design a space. The time for working in only one discipline is past.

Endowment should reframe its focus from mental health to well-being. Well-being touches on more than mental health, and includes aspects of efficacy and social relations. Well-being also reflects the interconnected nature of mental health.

The key question here: how are you going to *measure* your success?

Cosco also mentioned work NC State is involved with, in the "joint use" of outdoor spaces in schools (these spaces are also open to surrounding communities). Cosco highlighted the value of these resources for mothers. Information is available through NC State's parks, recreation and tourism management department.

In terms of policy, it is important to acknowledge and address concerns around liability.

Currently, there is considerable focus on large-scale urban design projects (e.g., transportation, sidewalks). We should consider what else we can do with existing environments.

Are there particular resources that I should be aware of?

- See http://www.naturalearning.org/nli-publications
- More specifically:

  Healing Gardens for Children

  Sensory Integration and Contact with Nature

  Developing Evidence-Based Design
- Kellert, S. R., Heerwagen, J., & Mador, M. (2008). Biophilic design: the theory, science, and practice of bringing buildings to life. Hoboken, N.J.: Wiley

Evidence-based standards and guidelines?

Preschool Outdoor Environment Measurement Scale (POEMS) up to 5 or 6 years old. It is applicable to other types of environments.

There are many audits of spaces available such as the Active Living Research program of the Robert Wood Johnson Foundation. Cosco prefers evaluation tools that include an element of feedback for the person who is using the tool to learn what to do if they are weak in a certain domain.

Measurements should also serve as guides for improvement.

Gary W. Evans

Elizabeth Lee Vincent Professor
Cornell University
Interview Date: June 6, 2014

Background

"Professor Evans is an environmental and developmental psychologist interested in how the physical environment affects human health and well-being among children. His specific areas of expertise include the environment of childhood poverty, children's environments, cumulative risk and child development, environmental stressors, and the development of children's environmental attitudes and behaviors." (From: http://www.human.cornell.edu/bio.cfm?netid=gwe1#sthash.fXo2TVFW.dpuf)

What factors or elements of the physical and social environments in children's places and spaces have the greatest potential to influence the positive mental health of children?

It is helpful to begin with an important distinction: Most of the research that has been conducted looks at aspects of the physical environment that cause health *problems* rather than *promote* good health.

In addition to factors highlighted in his 2006 paper, "Child Development and the Physical Environment (Toxic elements, Noise, Crowding, Housing and Neighborhood Quality, and Schools and Day Care Quality)", Evans noted new developments on obesity. There has been a lot of focus in this area, and on the connection between socioeconomic status (SES) and obesity (RWJ Foundation has funded research in this area). A good resource is Dube's 2010 book entitled *Obesity Prevention.* Obesity may be connected to certain aspects of child's mental health, including self-regulatory ability. Obesity is also characterized by strong tracking (e.g., it is very difficult to undo later in life).

Evans stressed the importance of remembering that things that are not clinically significant in early childhood may become significant later in life. Duration of exposure and intensity matter and should be taken into consideration in terms of what spaces and places to focus on. He offered an example of the importance of duration: Noise and blood pressure among factory workers.

In addition to obesity and the importance of duration, more recent research has also focused on the importance of loose parts and the ability to which a space promotes manipulation.

Finally, rigorous work continues to develop in the area of access to nature and the importance of places that promote restoration. Children and adults of low socioeconomic status (SES) have less access to natural spaces (crime or fear of spaces also contributes to this disparity of access).

Our project focuses on children ages birth to 5th grade. Are any of the factors or elements you just mentioned more important at different stages of a child's development, and, if so, how do they differ over time?

Opened-ended spaces are particularly critical when children begin locomotion.

Scaffolding is also very important, especially to young children when they start exploring the world around them. Kids need to be at the edge of where they are confident to grow. Adventure playgrounds and other types of environments that encourage exploration are critical when children start exploring. Litigation has really interfered with play in the United States.

If you were advising a philanthropic endowment with limited financial resources on the best strategy for transforming local spaces and places to promote the positive mental health of children, especially children from vulnerable populations:

What kinds of places and spaces would you recommend it focus on?

Evans encouraged a focus on using some resources to evaluate this project on places and spaces and positive children's mental health.

Priority area #1: The home, especially for low-income families. The home environment is critical in early childhood. Homes that are noisy, chaotic, crowded, and unsafe will have detrimental effects on a child's mental health.

In high-stress environments, parents are not as responsive. The broad objective should be improving housing quality so that it is at a level where it is not creating fear and anxiety in the parent. It is important to remember that caregivers also live and work in young children's places and spaces. Caregivers become less responsive in high-stress environments and this affects children.

Priority area #2: Places for restoration (e.g., gardens, parks, libraries).

The nature piece is critical to restoration. Evans spoke of the "hierarchy of spaces." Spaces need to be constructed or designed so that children can self-regulate the level of interaction they desire in the moment. We are social animals, but if we are around too many people, it backfires and leads to increased loneliness. The trick is to provide a diversity of space, including spaces for large and small groups, and for alone time. That way, children can regulate the type and amount of interaction they desire.

To what extent would you recommend the endowment base its focus on the amount of time children spend in the place or space?

Duration of exposure and intensity matter and should be taken into consideration when considering what spaces and places to focus on.

What types of quality improvements are the most cost-effective?

There currently is no good data or research that answers this question in a clear way.

Evans recommended we look at the National Academy of Science's Board on Children, Youth, and Families recent entitled, "Considerations in Applying Benefit-Cost Analysis to Preventative Interventions for Children, Youth, and Families." http://www.nap.edu/catalog.php?record_id=18708

If the John Rex Endowment wants the greatest results for its investment, it should focus on interventions that address and reduce poverty by increasing the number of resources available and accessible to low-income children *and* parents.

Many of the project's key stakeholders have expressed concerns that children from vulnerable populations often lack access to places and spaces that effectively promote their social and emotional development. How might the endowment direct its focus to address this concern?

He recommended talking with Ralph Taylor at Temple University who is an expert on crime and safety.

As part of this project, we plan to conduct case studies that examine places that have successfully promoted the mental health of children. Can you identify a few specific places and spaces that are especially effective at promoting children's positive mental health?

Evans recommended the following strategy:

Look to those countries where poor children are worse off than their middle class peers but less bad off than children in the U.S. Take, for example, countries like Sweden and Scandinavia. What are those countries doing differently?

He also recommended looking into the policy/strategy of "Co-housing."

Are there particular resources that I should be aware of? Scholars or organizations with expertise in this area?

- Robin Moore, NC State
- Environmental Design Research Association

  www.edra.org
- IAPS (International Association People-Environment Studies)

  www.iaps-association.org
- Gary Moore, Emeritus Professor of Environment-Behaviour Studies at the University of Sydney
- Roger Hart, City University of NY
- David Satterthwaite, International Institute for Environment and Development
  www.iied.org

Articles or books?

Journal of Children, Youth and Environment (http://www.colorado.edu/journals/cye/index_issues.htm)

Robert Gifford's textbook (*Environmental Psychology: Principles and Practice*)

Evidence-based standards and guidelines?

Gary Moore's developmental scales for child-care centers are very good and thoughtful. The scale is the Children's Physical Environment Rating Scale (CPERS).

What's one question I didn't ask that you think I should ask going forward?

Evans suggested that instead of focusing on how to prioritize spaces or elements of spaces, the key focus should be on cumulative risk. There is extensive research on cumulative risk. The number of risk factors you are exposed to is linearly related to severity of negative health outcomes. The presence of multiple risk factors is why vulnerable populations are vulnerable. Develop strategies and interventions that reduce cumulative risk.

Andrea Faber Taylor

Child Environment and Behavior Researcher
University of Illinois at Urbana-Champaign
Landscape and Human Health Laboratory
Interview Date: June 10, 2014

Background

Expertise in children's outdoor environments, especially green spaces, and how they can be supportive of children's development. Taylor's research has focused on vulnerable populations, including children from extremely impoverished urban neighborhoods or children with ADHD.

What factors or elements of the physical and social environments in children's places and spaces have the greatest potential to influence the positive mental health of children?

An important area not tapped into is fostering attention restoration (see research by Stephen and Rachel Kaplan of the University of Michigan). The theory is well developed and tested. We live in a very attention-fatiguing environment where demands on our attention and the necessary capacity to focus are very high.

Attention Restoration Theory (ART): we have to attend to and filter so much information coming at us. This process requires mental muscle that researchers refer to as directed attention. It fatigues with use. Excessive fatigue leads to detrimental outcomes in adults and children: irritability, increased mistakes, and impulsive conclusions. While there is less research around the impact on children, there is reason to believe that they may experience increased levels of fatigue since they are not born with fully functioning capacities.

This theory has lead experts to research how environments may be restorative. Work by the Kaplans has identified four characteristics that promote restoration. It is not necessary to have all four characteristics, but green spaces do, which makes them especially effective/efficient.

Both time spent in green spaces and views of green spaces have been found to have positive benefits for children. Some studies have compared places where there is no green space (a barren, built environment) to places where there is minimal green space (e.g., two shade trees). These studies have found that even the smallest amount of green space makes a difference.

Taylor stressed the importance of engaging in pretend play/a creative form of play. Green spaces support and encourage this type of play. She also referenced Simon Nicholson's theory on the importance of "loose parts," and lamented the high cost to children of taking the loose parts away in an effort to keep children safe. Play in green spaces tends to encourage more conversation and negotiation, both critical to social development. Taylor remarked that when kids play collaboratively, especially imaginatively, it is amazing how they all get on the same page.

Taylor also commented that green spaces alone are insufficient without adult-child interactions. Even when we provide green spaces, it is important for parents and other adults to play more with children. Taylor added, stressing the importance of green spaces for children, adults suffer from fatigue, too.

Taylor referenced a study that compared views students had from classrooms and cafeterias. The study found that students performed better when they were enrolled in schools that provided views of green spaces from the cafeteria (but not classroom). The benefit of views of green spaces from cafeterias supports the theory of attention restoration.

Additional research has found students with ADHD (symptoms similar to attention fatigue) also benefit from interactions with green spaces. Green spaces, according to Taylor, help students be their best.

If you were advising a philanthropic endowment with limited financial resources on the best strategy for transforming local spaces and places to promote the positive mental health of children, especially children from vulnerable populations:

What kinds of places and spaces would you recommend it focus on?

Daycares and schools (start with young children in day care, preschool, and elementary school). Once kids do get home, parents often don't have time to take children to a green space. Most out of school time is already scheduled.

She also recommended making the facility more like a home, and including programming that mimics activities of home life: participating in gardening, food production, cleaning, etc.

Taylor noted that when children bond with nature at an early age, recent research indicates that they grow up better stewards of nature. Having that intimate knowledge is so important.

To what extent would you recommend the endowment base its focus on the amount of time children spend in the place or space?

Taylor focused on daycares and schools because these are places where children spend the most time.

What types of quality improvements of these places and spaces would you recommend it prioritize?

Taylor said it is important to focus on the "richness" of the green space. A mowed lawn is not enough. Diverse green spaces that invite play and creativity and attract the diversity of life (birds, insects, etc.) are key elements of a rich green space.

Many of the project's key stakeholders have expressed concerns that children from vulnerable populations often lack access to places and spaces that effectively promote their social and emotional development. How might the endowment direct its focus to address this concern?

Daily access is critical if one of the important benefits involves attention restoration. Traffic/parking/lack of bike racks/no bathroom/no bench – these are all obstacles that prevent families with children from visiting green spaces. It is also important to have elements that attract the parents. Taylor acknowledged that few people send their children to the park anymore and noted that we can at least provide these settings in schools and daycare centers.

As part of this project, we plan to conduct case studies that examine places that have successfully promoted the mental health of children. Can you identify a few specific places and spaces that are especially effective at promoting children's positive mental health?

- Ruth Staples Child Development Center – University of Nebraska (also partner with Nature Explorer): http://cehs.unl.edu/cyaf/ruth-staples-lab/
- Chicago design firm – Hitchcock design group; Chicago Commons Paulo Freire Family Center; redesigned schoolyard space benefitting a low-income area.

Are there particular resources that I should be aware of? Scholars or organizations with expertise in this area?

- Nilda Cosco, Director of Programs, NC State's Natural Learning Initiative
- Robin Moore, NC State's Natural Learning Initiative
- Stephen and Rachel Kaplan, University of Michigan
- childrenandnature.org

Articles or books?

- *Ecological Literacy: Educating our Children for a Sustainable World*
- *With People In Mind*, by Stephen and Rachel Kaplan

Evidence-based standards and guidelines?

- POEMS tool developed by Dr. Robin Moore and a team of other scholars

Russ Lopez

Assistant Professor
Boston University School of Public Health
Interview Date: June 16, 2014

Can you tell me more about your role with the Boston Schoolyard Initiative?

I didn't have a formal role with the project. The team at BSI wanted to document their process and their impacts. I conducted a few analyses and wrote some reports for them.

BSI disbanded this year because they had renovated all the schoolyards in the city. This was decided a year before they disbanded, before the change in mayors.

What elements of the physical environment have the greatest potential to influence the positive mental health of children?

People don't realize to what extent urban spaces have been degraded. Before BSI, Boston's schoolyards had no trees, no green space, they had just been paved over. The pavement was often cracked from the harsh winters. They were littered with garbage. This city was a very extreme case in terms of schoolyard quality before and after.

Turning the schoolyards around and cleaning them up made them usable during school time and after school hours. Students in Boston public schools are bussed all over the city, so their schools improved as well as the spaces near their homes. In the summer and after school, the schoolyards were utilized more by local children. They used to be empty and now they are always full of life.

There may be a psychological effect for the schoolchildren and community, just showing that someone cared about their spaces. After a BSI renovation, people that lived around the schools had better opinions of the schools.

BSI also made a conscious effort to make the schoolyards into outdoor classrooms. It is important to get students outside for more than just recess.

What is the best way to achieve sustainable change to improve children's environments? (Attention to building new spaces and/ or renovating already existing ones)

Building new schools in densely populated areas is problematic because the new schools would be far away from where people live. The benefits (less maintenance, new appliances and fixtures) are outweighed by the negatives of children having to travel very far to get to school. The schools would be less accessible to children and their families. Renovating existing spaces accomplishes two goals. One is enhancing a space that is potentially a community blight. The second is turning a previously underutilized space into a usable one. Building new would leave the blight of the old schoolyard intact, and potentially make it worse.

How did BSI leverage the support of other influentials (e.g., public or private funders, businesses, community leaders)?

The program touched on a number of local funders' agendas. The main grants were from education and environment-focused groups. The initial push happened in the right place at the right time and the Tufts University Goldberg Seminar reports were the catalyst.

About the Goldberg Seminar reports (http://activecitizen.tufts.edu/goldberg/goldberg-initiative-reports/): For nearly two decades, the Goldberg Seminar reports have informed Boston's civic discourse, leading to enduring changes. The reports were published by the Boston Foundation and widely disseminated throughout Greater Boston and across the country. Perhaps the most influential Goldberg Seminar to date focused on parks and open spaces, and resulted in

one of the country's most highly-regarded blueprints for restoring urban parks called The Greening of Boston. It proposed an action agenda that led to a doubling of the city's maintenance budget and paved the way for a dramatic parks turnaround.

Another advocate and partner at the outset was the Boston Greenspace Alliance. This group was inspired by the environmental justice movement to work on green issues inside the city. The group recognized there was a legacy in the city of a lack of open space. In particular, there was a lack of access to parks for the youngest children. Two key people made it happen, the head of Greenspace Alliance and a partner at the Boston Foundation. All of the parties involved at the outset were interested in environmental education and advocating for parks.

The high cost of the program can be a real barrier to replication. The initiative cost $30M over the years. Much of it came from state and city money for education, but it couldn't have happened without the private dollars as well. Private dollars came from primarily local foundations. The private dollars paid for materials such as trees and grass but mostly paid for time. The community process required many hours. BSI and districts had to hire extra consultants.

The biggest challenge in the community planning process was always the conflict between what the budget allowed for and what people wanted. This was always the biggest frustration. Communities would say, "We don't know how much money we have, we don't know what will work." There was a delay in response from the city, so the community would have a great plan and then find out later that it wasn't feasible. It was always the city having to come back and say "no" again and again.

The public dollars came out of the school capital budget. It cost about a couple hundred thousand dollars per school. Schools applied through a competitive process. For schools that needed a project but wouldn't apply, BSI gave planning grants to hire a planner. A lot of schools hadn't had site plans before. Architects worked with school planning groups to plan the renovations. The school planning groups varied in size and makeup. Principals were always involved. Some schools had teachers and students involved. Traditionally, when it comes to school capital and renovations, someone just tells the school what to do. This process was a breath of fresh air for community stakeholders who now had a say in their schoolyard.

Monica Pallett

Community & Outdoor Learning and In-service Training Coordinator
The Little School at Duke
Interview Date: June 11, 2014

Can you tell me more about your role at the Little School?

Monica was program manager at Duke's Little School from 2012-2013, running the day-to-day operations of the school. She had a personal interest in conservation, sustainable lifestyles, and introducing young children to the outdoors and transitioned into the role of Community and Outdoor Learning and In-service Training Coordinator for both the Hillsborough and Duke Little Schools. In that capacity, she planned and implemented all training for staff members. She also oversaw all outdoor learning, from coordinating gardens, to taking children out into wild spaces.

About the Little School's woods excursions: In Hillsborough, most of the land that they go on is owned by the town of Hillsborough and a developer that has yet to develop his land. The school's leader got the developer's permission to use his land for nature walks. Monica got permission from a local watershed to go to the watershed. In Durham, they use Duke's property, also with permission.

What elements of the physical environment have the greatest potential to influence the positive mental health of children?

We have a number of kids with sensory or behavioral challenges and they are usually completely different children out in the woods and playing in the creeks. On average, all of our children are far more cooperative, helpful and mature when we are on adventures out in the woods and there is now a strong body of research to support these observations.

Being out in the woods also allows teachers to de-stress and allows them another way to connect with kids. These caregivers' mental health is another important factor to consider when attempting to increase the mental health of children. Adults experience the stress of having to keep up physical spaces like playgrounds and classrooms. It is a burden to keep up things when kids degrade and break them but in the woods, this is not an issue. Adults can connect with students in different ways.

The EPA published a report about tree canopies. When people are under a canopy, their cortisol levels drop, which leads to enhanced physical and mental health.

The concepts of responsibilities and school jobs translate really well to having a conservation curriculum, understanding that we're part of wild spaces and we have responsibility to take care of the life here. Children are used to feeling vulnerable and powerless. But when they get the opportunity to be a caretaker of vulnerable things, it makes them feel more competent and secure in the world.

It is important for children to have uncompressed time, letting them lose themselves. Not structured play, but time for them to lose themselves and lose track of time, to be engaged with what they choose.

Noise inside classrooms can be detrimental to children's mental health. That level of noise doesn't exist in the woods.

Are there other ways that children's places and spaces can play a greater role in supporting the positive mental health of children (e.g., as a connector of families to important community resources or by improving involvement and engagement of parents)?

Families come to the Little School on garden days. The center feeds them lunch and children and parents and teachers plant together.

How do stages of children's development make a difference? (e.g., 0-3, pre-school, grades K-3, and grades 4-5)

The Little School takes children across the street, into the woods as soon as they're able to walk. Starting at 18-20 months old, they go to shallow creek areas and play in the water. The earlier you start them, the better. They become natural hikers. Even before they're verbal, they understand to stay in a line and follow safety instructions. Teachers tell them what to look out for: poison ivy and snakes mostly.

Older children get to take care of the younger children in some ways. For example, the older children scrubbed the slippery rocks and put sand on them to make them safe for the younger children to walk on. They all pick up litter together.

According to the literature, environmental education doesn't necessarily influence the conservation mindset of adults. Being in nature, having complete immersion in nature does influence opinions and actions related to conservation.

What is the best way to achieve sustainable change to improve children's environments? (Attention to building new spaces and/ or renovating already existing ones)

Monica is interested in working with a conservation group to identify wild spaces near child care centers and preschools that can be put in trust for education. She envisions the children becoming caretakers of these spaces and using them for exploration and learning. It would benefit both the spaces and the people involved. This land could be owned by churches, governments, institutions like universities, etc.

How did you leverage the support of other influentials (e.g., public or private funders, businesses, community leaders)?

Monica developed partnerships with various university and community groups. These include facilities and sustainability offices at Duke to get permission to play in their woods and creeks, watershed management and outreach teams at both schools where they have adopted nearby creeks, agricultural extension agencies at both schools, Audubon society at both schools to do birding projects, and Orange County solid waste management's outreach person worked with their pre-k teachers to make worm bins for each classroom. Future partnership goals include the North Carolina Forest Service and The Sierra Club to make more spaces accessible to the schools and then to develop real hands-on activities for teachers to do with children which take care of those spaces.

Going forward we are going to be interested in looking at how different strategies compare to one another. Some criteria for comparison are cost, practical feasibility (e.g. what JRE can reasonably influence), the number of non-profit places and spaces currently in Wake County that JRE could potentially influence via the intervention, and the number of vulnerable children whose mental health is improved by the intervention. Can you talk about some of these considerations and perhaps some of the challenges you've faced in this work?

Traditional teachers are less likely to take the children out into the woods. The Little School has been hiring people who enjoy nature and for teachers who identify with the classroom space more, Monica is interested in why they are uncomfortable leaving for the forest.

State regulations do not govern the actions of child care centers outside the fenced walls of the center. The state considers it a field trip every time the children leave.

Transportation could be a barrier if there are not natural areas near the school. The Little School uses the Duke bus and the Hillsborough local bus system to go to parks and the library. Traveling via bus empowers children to be their most responsible grown-up selves, and they rise to the challenge proudly.

Safety is of utmost concern; have to have a good safety culture.

It can be prohibitively expensive to create a new child care center. There are costs associated with the building being in compliance with licensing. For example, the fire marshal needs to check your building, it must be in compliance with sanitation requirements. Monica envisions a child care center where the children move from public space to private space throughout the day and no building needs to be built or renovated for the center's use. The children use the spaces that already exist. For example, the children would go from library to community center to community garden to church. There could be different groups of children rotating through the spaces during the day. The spaces are based on partnerships with public and private entities. With the savings from the building costs, the organization could pay its people more and have better-qualified personnel.

There are places that focus on making natural play spaces at schools, which is well-intentioned but costs time and money trying to approximate a wild space instead of using a real wild space.

Afterschool for children through fifth grade could be a possibility. It could be a job creation scheme, training middle school kids and high school kids to work with younger children in wild spaces. Older children would gain teamwork and leadership skills, and all would gain conservation skills and positive mental health.

Have other localities – cities, towns, school districts, parks and recreation departments, implemented practices or programs related to places/spaces for positive children's mental health?

Summer camp programs.

Forest kindergartens.

Children First in Durham, a child care center run from a home.

Learning Outside, in Orange County offers a forest kindergarten for kids three and older. Targets the homeschool community. Kids are outside all day. One of their volunteers founded the first forest kindergarten in US. Wendy Banning, the director, could be a resources.

What aspects of Wake County's specific context and conditions (e.g., geographic layout, politics, and climate) have implications for the development and implementation of the integrated plan for optimizing places and spaces?

Monica doesn't think it would be any different than Hillsborough or Durham. She would be willing to take teachers out to woods and help them develop confidence in that topic.

Are there particular resources that I should be aware of?

Research on forest kindergartens.

Whom else should I talk to?

Google "nature preschools." Greenhearts.org has a lot of information on nature preschools as well.

Ania Shapiro

Architect, Child Care Division
Facilities Management & Services Programs
US General Services Administration/PBS
Interview Date: June 13, 2014

Background

Chief national architect overseeing 110 centers across the nation that work with children aged five weeks to pre-K. Shapiro has a great interest in and passion for designing spaces for childhood development. In her role, she works closely with architectural firms to ensure they are complying with best practices established by the General Services Administration (GSA).

What factors or elements of the physical and social environments in children's places and spaces have the greatest potential to influence the positive mental health of children?

The most important criterion is to create a nurturing and safe environment. A full explanation of the different factors and elements that go into a safe and nurturing environment is in the GSA Child Care Center Design Guide (see end of interview for link to guide). Shapiro stated that she works to ensure spaces meet all federal and state criteria and requirements and that 90% of their centers were NAEYC accredited (compared to approximately 10% nationwide). Shapiro also stressed the importance of creating spaces that are as homelike as possible, and non-institutional.

Additional factors: environmental sustainability, integrated design (included well integrated with the community), and the quality (and well-being) of providers. Shapiro said she continually notices when she goes into a center that when there are happy teachers, the children are also happy. Finally, access to green space natural light in every classroom, access to a playground with separated areas for different age groups, and the design of the classroom are all essential components. With regard to the playground, she stated that GSA was trying to create playgrounds that had a more natural and wilder feel – but they were often limited by regulations.

Our project focuses on children ages birth to 5th grade. Are any of the factors or elements you just mentioned more important at different stages of a child's development, and, if so, how do they differ over time?

Shapiro stated that the age of a child is important to take into consideration when designing a space, as children's developmental needs differ widely over the age range covered by this project. She referenced the GSA Child Care Center Design Guide as place to learn more.

If you were advising a philanthropic endowment with limited financial resources on the best strategy for transforming local spaces and places to promote the positive mental health of children, especially children from vulnerable populations:

What kinds of places and spaces and quality improvements would you recommend it focus on?

Shapiro opened by remarking on the importance of early childhood education. There is no better investment we can make. In her opinion, the biggest return on investment will come from focusing funding on projects that benefit the youngest children. Shapiro also lamented the expense of child care, which often means only middle class and upper class families can afford it and those who may need it most cannot.

In terms of priorities, Shapiro encouraged the John Rex Endowment to pay attention to the physical design of child care centers, including natural light and the playground, proper didactic programming for the children, and the

quality of the provider. Place an emphasis on getting support from the community and parents, and use this support network to determine proper spaces for any new places. Good design is essential. A center should foster a nurturing home life environment where children are allowed to learn by play.

What types of quality improvements are the most cost-effective?

Shapiro noted that one of the challenges they constantly face is that high quality centers are very expensive. However, she restated her belief that the investment is one of the best.

Are there particular resources that I should be aware of?

GSA Child Care Center Design Guide

http://www.gsa.gov/graphics/pbs/designguidesmall.pdf

Kyle Snow

Director for the Center for Applied Research
National Association for the Education of Young Children
Interview Date: June 19, 2014

Background

Snow has directed the Center for Applied Research since 2010. His team ensures that NAEYC's work has basis in research and fosters communication connecting research, policy, and practice. Prior to this position, Snow received training in developmental psychology at Cornell University.

What factors or elements of the physical and social environments in children's places and spaces have the greatest potential to influence the positive mental health of children?

NAEYC has program standards that guide the structure of the environment for young children. All guidelines are captured in our early childhood program standards. Some of them are directly related to physical environments and mental health.

Snow focused on a set of best practices that build from a pyramid approach. The base consists of developing an environment supportive of children's positive relationships and growth. Once that foundation is built, the next step is to ensure regular, flexible activities. Lastly, include parents and teachers in identifying challenges in development and then marshal resources to provide intervention where needed. This approach will create diverse and challenging environments that provide benefits for social and emotional well-being and academic outcomes. For example, with play environments, each should allow opportunities for children to play in multiple ways.

Safety should always be paramount.

If you were advising a philanthropic endowment with limited financial resources on the best strategy for transforming local spaces and places to promote the positive mental health of children, especially children from vulnerable populations:

What kinds of places and spaces would you recommend it focus on?

Snow recommended focusing on developing an environment that addresses specific vulnerabilities head on. For example, an environment that addresses the needs of low-income children would include access to high-quality food, clean, wide-open spaces to play, technology, and books.

One thing we are starting to know: children growing up in high-risk environments are themselves at heightened risk of poor developmental outcomes. These children are often not effectively screened for problems until the problems are manifested – screening is important, and then acting upon the net result.

A lot of literature and programs emphasize focusing on spaces where we can actually reach families. For example, there are literacy programs that work through the context of pediatricians' offices. Most families get their kids to see some kind of pediatrician during the first months of life. The pediatrician's office is a great access point for families who otherwise would not be on the grid. Also, some innovative work has been accomplished through public libraries, which provide a different access point. Churches within African American communities provide another important access point.

Think about access points. Snow recalled a recent effort that worked through the local public transportation system to communicate information to the community, which was successful because it effectively targeted the audience for dissemination.

As part of this project, we plan to conduct case studies that examine places that have successfully promoted the mental health of children. Can you identify a few specific places and spaces that are especially effective at promoting children's positive mental health?

Tulsa, Oklahoma: Community Action Project (Steve Dow, Director). This not-for-profit organization functions as hub for a whole range of social and human services. One of the challenges facing community-based non-profits in terms of service delivery is that funding streams come from so many places, and each funding stream has to be managed. A few community agencies do a great job pooling together all the services that vulnerable families need.

Are there particular resources that I should be aware of?

- ACF: Building financial stability for families project, Building Strong Families project
- Vanderbilt: Center on the Social and Emotional Foundations for Early Learning (NAEYC builds off the pyramid model developed by Vanderbilt)

Anne Taylor

Emerita Professor
School of Architecture and Planning
University of New Mexico
Interview Date: June 19, 2014

Background

Taylor is "an ACSA Distinguished and Regents Professor Emerita from the School of Architecture and Planning at the University of New Mexico where she spawned the Architecture and Children program and did research on the effects of the physical environment on learning and behavior. Internationally known, she is co-author of Architecture and Children curriculum, guidebooks, and recently published *Linking Architecture and Education: Sustainable Design of Learning Environments.* Anne's goal is to implement Design Education in schools everywhere, to tap children's and adults' creativity and to tie creative design projects to math, science, technology and the arts. She says we should go from STEM to STEAM and include all the arts including architectural design in children's education." (from: http://architectureandchildren.com/index.php/about/who-we-are).

See **TED Talk video** that Taylor delivered in September on linking Architecture and Student-Centered Learning Environments (http://youtu.be/AoSMYeAI87Q)

On teaching architecture and design to children: No subject is more interdisciplinary than architecture. Every kid ought to have a measuring tape and measure the world.

Q: Is architecture an appropriate subject for young children? Yes. Even in preschool, kids are building with blocks and learning foundational concepts of architecture and design.

What factors or elements of the physical and social environments in children's places and spaces have the greatest potential to influence the positive mental health of children?

Even the schools being built today are built and functioning in the same old thing. That is not the answer. That model is obsolete. It gives no power to children to do their own learning. Instead, Taylor recommends transitioning to the "architectural design studio" model. "It is my feeling that we need to turn classrooms into studios where students can learn by themselves." The teacher does not need to be up in the front of the room with students in straight rows. A studio design includes places and centers for different kinds of activities. One of the problems is that our teachers are not trained to use these kinds of spaces.

Highly recommended some videos on Edutopia of collaborative efforts to redesign classrooms:

http://www.edutopia.org/remake-your-class-collaborative-learning-video (reviewed this video; it is an excellent example of working with a small budget to change a classroom in one weekend and using a process that involves a teacher and students in the design process). See also: http://www.edutopia.org/master-classroom

We need to create more exciting environments that make kids go, "wow!" Let's knock down walls between classrooms, and use the core curriculum standards to inform design. It takes a lot of thought and a lot of work. And one challenge is that school districts hire "value engineers" who do not know about child development and are charged with building a space to accommodate a certain number of children at the lowest cost.

If you were advising a philanthropic endowment with limited financial resources on the best strategy for transforming local spaces and places to promote the positive mental health of children, especially children from vulnerable populations:

What kinds of places and spaces would you recommend it focus on?

Priority 1: Homes & Parenting

Coach parents how to set up learning environments in the home.

Priority 2: Classrooms

Visit the nearest school of architecture and look at their classroom spaces and the way instruction occurs within it. New spaces will require a new curriculum. Taylor has written curriculum for design studio classrooms for a school district in CA. We should translate developmental needs into architecture and see how the core curriculum relates to design principles. School spaces – their design and architecture – can become learning tools, like museums.

Priority 3: Natural Environments & Green Spaces

Referenced the growing body of research that makes a compelling case for natural environments, green spaces and playgrounds. Pointed to a school in Flagstaff, AZ that has a nature trail around the school. All students and teachers walk one mile around the track before school.

Involving children and parents where possible is important. You can even include preschoolers. Taylor worked with 4 and 5 year olds to design a playground. She involved architect students who worked with children using clay, drawing, and model building.

Spaces should be multisensory, and focus on supporting concept development, developmental needs, and the core curriculum.

Are there particular resources that I should be aware of?

- Basic Needs chart in the back of her latest book, *Linking Architecture and Education: Sustainable Design of Learning Environments*
- See also: The Ecology of The Learning Environment: http://education.jhu.edu/PD/newhorizons/future/creating_the_future/crfut_taylor.cfm

An excerpt follows:

"Classrooms for the Future

In our workshops and seminars where teachers and children were asked to redesign their classrooms for the future, many unique design ideas have emerged beyond the given developmental and curricular determinants.

Some of the following represent those ideas:

1. *Eliminate desks and substitute other personal space storage and writing surfaces.*
2. *Design light and moveable partitions. Children will be moving through the environment in the future.*
3. *Create mobile furniture that has multiple uses for children.*
4. *Create an environment that is receptive to new technology and electronic devices.*
5. *Create stackable seating scaled to children.*
6. *Provide for privacy in the classroom. Corners are relatively unused spaces which could be privacy "relief" places. Some children learn better by themselves or in small groups in private spaces.*
7. *Use innovative storage systems for tables and computers to free space for other activities.*

8. *Give heating, cooling, plumbing information in the architecture by leaving a portion exposed.*
9. *Design colorful, attractive, and hospitable hallways.*
10. *Design a Velcro wall to which special instructional items can be attached.*
11. *Design hallway graphics and mini-museums.*

The rationale for this programming process is based on research from the field of Design and Behavior, which shows that if a learning environment is designed based on what is taught and learned, and if the facilities or adjacent spaces reflect concepts and principles to be learned, then both behavior and learning are affected by the design of the environment."

Lisa Tolley

Environmental Education Program Manager
Office of Environmental Education and Public Affairs
NC Department of Environment and Natural Resources
Interview Date: June 30, 2014

Background on the Office of Environmental Education and Public Affairs

The environmental education section of the NC Office of Environmental Education and Public Affairs in the NC Department of Environment and Natural Resources was established to increase environmental literacy and natural resource stewardship in North Carolina by encouraging, promoting and supporting environmental education programs, facilities and resources throughout the state.

The office manages a nationally recognized professional development program that certifies educators in environmental education. The NC Environmental Educator Certification Program provides enrollees with outdoor teaching skills, science and nature content knowledge and environmental education methods. The program is widely recognized as a credential for hiring purposes across the state, and many enrollees credit the program with advancing their careers. The program has certified more than 1,000 individuals and there are currently more than 700 enrolled in the program.

The office serves as a liaison to the Department of Public Instruction to ensure that environmental and related science content is integrated into the Common Core State and NC Essential Standards. They also work with DPI to connect teachers with the many workshops, field trips, materials and other non-formal educational opportunities offered through city, county, state and private science and environmental education facilities throughout the state. Many classroom teachers take advantage of the NC Environmental Educator Certification Program, the NC River Basin publications and the multitude of resources and professional development opportunities identified and promoted by their office.

Is positive mental health one of the motivations behind the work that you do?

It is. Natural spaces have been shown to restore people, even just views of them from windows.

A movement toward more natural areas is getting more popular in NC. More and more facilities are adding this type of natural space. The movement is continuing to grow. Child care centers are incorporating natural play areas. We've seen schools creating outdoor classrooms. On our website, there is a list of 200 facilities that incorporate natural spaces for children. The list includes botanical gardens, arboretums, and aquariums, but we've see an increase in facilities with other goals adding natural space.

The zoo in North Carolina added a kids' zone with a mud pie station and water station. They also have a woman who went to England and completed a play trainer program where you learn to play.

I'd love to learn more about work that's being done in Wake County now, and where you feel there may be room for improvement or expansion on those efforts.

In this area, the movement builds from the idea that children aren't in the outdoors enough anymore. Many people have experiences where their grandparents, their parents, or they themselves grew up on a farm. It's great to say kids should be free-range, to explore and play, but it depends where you are. If you're in an urban area, there may not be private or public areas for children to safely use to be in nature.

Maryland has a map of natural play areas and our office is in the process of making a similar map.

The Kids Together Park in Cary and other child care facilities that Nilda and Robin (at the Natural Learning Initiative) have assisted are also great examples of works in Wake that are moving toward this idea of children in nature. Preschools reach out to my office and say they need help with their outdoor area. They have just one structure on asphalt, no shade, trees, sand, or grass. I refer these preschools to NLI constantly.

Our office certifies people in environmental education. They have to do a community project when they finish their certification. Many certified individuals organized to plan and build the types of spaces I've described.

I'm on the leadership team for Children in Nature in North Carolina. Children in Nature is a national organization.

Many of the project's key stakeholders have expressed concerns that children from vulnerable populations often lack access to places and spaces that effectively promote their social and emotional development. How might the endowment direct its focus to address this concern?

We got 20 Americorps volunteers who focus on underserved populations. In order to define underserved, we look at tiers of counties, free and reduced price lunch eligibility, and physical and mental disabilities. Two Americorps members worked with the Salvation Army's Center for Hope. The volunteers added vegetable gardening beds.

Another local organization working with high-risk populations is the Botanical Garden in Chapel Hill. They were working with at-risk youth, particularly teenage girls. They also have a horticultural therapy program there that goes out to children's hospitals.

Every year we survey teachers to figure out what the barriers are to implementing environmental education. Transportation is always ranked right up there. I know organizations that have partnered with rental car places to get donations of vans and funding for different projects. That type of corporate sponsorship can increase access and transportation. We've got a lot of members that are informal educators that target underserved schools. They go out to underserved schools. But then there's a catch-22 because state parks want them to come see the park, get that immersion, but access is more difficult that way. Some state parks have found that if they attract teachers, offer perks to them, they will find ways to get children out. For example, free park passes to teachers.

Many of the project's stakeholders are also interested in how interventions can impact caregiver-child interaction. That could be relationships between parents and children or even teachers and children. How might the endowment direct its focus to address this concern?

I know a member who targeted a low-income housing complex for a program including bird boxes. They worked with families and children, looking at and taking care of the local bird life.

The Walnut Creek Wetlands Center is a partnership started through an Episcopal church in an underserved area of southeast Raleigh. The church was instrumental in getting it built. So kids in that neighborhood that don't have as much to do in the afternoons are engaged in the Wetlands Center. Sherry A. Graham is the Director of the center.

As part of this project, we plan to conduct case studies that examine places that have successfully promoted the mental health of children. Can you identify a few specific places and spaces that are especially effective at promoting children's positive mental health?

The Grove School in Cary: http://www.groveschool.com/cary/

As far as outdoor elements, you may want to visit the Kids Together Park in Cary (Robin Moore with NLI was one of the designers: http://kidstogethercary.org/index.htm)

White Deer Park in Garner has a natural playground http://www.youtube.com/watch?v=BXk-TJ0bgGc (video by Joe Miller)

Prairie Ridge EcoStation in Raleigh has a nature play space http://naturalsciences.org/prairie-ridge-ecostation/nature-play-space as does the

NC Botanical Garden http://www.wral.com/lifestyles/goaskmom/blogpost/11089325/

Chapel Hill Botanical Garden. Nancy Easterling, Director of Education.

The U.S. Environmental Protection Agency and the National Institute of Environmental Health Sciences have a child care facility in Research Triangle Park called First Environments Early Learning Center

From the FEELC website:

Designed to maximize natural light, FEELC's "interactive building" uses found objects and donated materials that change in response to children's interests. The grounds hold many gardens, including an edible garden harvested for meals at the school, natural areas for exploration, a playground and outdoor stage. Found objects made into art by children hang from ceilings, walls and are scattered indoors and out.

FEELC's sustainable operations policy creatively and cooperatively maximizes funds, staff and community resources. Sustainability permeates both programming and operations. Creatively reusing discarded and donated materials teaches conservation while fostering creativity. Gardening introduces earth friendly practices like mulching, capturing irrigation water and planting to attract bees and butterflies. Catching and releasing small insects for study inspires scientific exploration and demonstrates the need to preserve natural habitats.

FEELC recruits and retains professional teachers who are dedicated to the hearts and development of young children. Staff collaboration, cross-training and the opportunity to use individual creativity make for very low turnover rates among staff.

Are there particular resources that I should be aware of?

- The Southeastern Environmental Education Conference is in September. It takes place near the North Carolina Zoo. That might be a good place to meet others who are working in this space.
- Horticultural Therapy Program at the NC Botanical Garden http://ncbg.unc.edu/horticultural-therapy
- Healing and Hope Through Science is a program of the North Carolina Botanical Garden that serves hospitalized children at Duke and UNC hospitals. http://ncbg.unc.edu/healing-and-hope
- American Horticultural Therapy Association http://ahta.org/horticultural-therapy
- Closing the Achievement Gap: Using the environment as an integrating context for learning. See attached document. Gerald A Lieberman has done research on benefits of integrating the environment into the curriculum using an interdisciplinary method. http://www.seer.org
- David Sobel – http://www.antiochne.edu/employeedirectory/david-sobel has done work on place-based education and cognitive development of children. Beyond Ecophobia: Reclaiming the Heart in Nature Education. David Sobel has written a great deal on this subject. http://www.amazon.com/Beyond-Ecophobia-Reclaiming-Education-Literacy/dp/0913098507
- Kids in Parks http://kidsinparks.com/about
- Several NC State Parks are in partnership with Kids in Parks to do Track Trails.
- Last Child in the Woods – Richard Louv http://www.amazon.com/Last-Child-Woods-Children-Nature-Deficit/dp/156512605X
- Both the Center for Human Earth Restoration and the Center for Education, Imagination and the Natural World focus using children and the environment and follow the philosophies of Thomas Berry.

- Center for Human Earth Restoration http://www.centerforhuman-earthrestoration.com and the video, Making Peace with Bugs http://science.unctv.org/content/making-peace-bugs
- Center for Education, Imagination and the Natural World http://www.beholdnature.org/programoverview.php

These are links to the results from two teacher surveys we sent out to determine how non-formal educators could better serve teachers

Beyond the Field Trip: What Teachers Really Need

http://web.eenorthcarolina.org/resource/about.aspx?s=106876.0.0.37430

http://web.eenorthcarolina.org/core/item/page.aspx?s=112317.0.0.37430

We are located in the Nature Research Center in downtown Raleigh and have an environmental literacy center. To search the catalog visit http://catalog.ncdcr.gov/vwebv/searchAdvanced and choose “Environmental Education Office” under “Library Location.”

Cynthia Uline

Director, National Center for the Twenty-First Century Schoolhouse
San Diego State University
Interview Date: June 17, 2014

Background

Uline's work extends over the past 19 years, first in higher education at Ohio State University, where she focused on school design and its influence on learning and the community. She also taught a course on facility planning. Now Uline serves as the Director of National Center for the Twenty-First Century Schoolhouse. She has developed an online facility planning certificate program. Her research has looked at the relationship between the physical and social environments in K-12 schools, and includes quantitative and qualitative analysis (e.g., surveys combined with case studies). She also has an interest in sustainable school design and leadership.

What factors or elements of the physical and social environments in children's places and spaces have the greatest potential to influence the positive mental health of children?

A repeated message from students is that a factor that matters most is their sense of belonging. What aspects of the physical environment help them feel connected? Qualities include movement (ease with which people can find their way through a building), ability to be independent in spaces, and elbow room. Dense populations are usually a negative factor in student learning. Students should feel like they have the space to stretch and move, the ability to be comfortable and able to learn. Classrooms must be flexible and responsive (to both students and teachers). Flexible means space being able to change based on activity.

Others important aspects of spaces include play of light (presence of natural light), views from the outside, social exchange, aesthetics (pleasing nature of environment; clearly tied to notion of belonging), safety and security.

See Uline's article "The Walls Speak" for a full review of this research.

Our project focuses on children ages birth to 5th grade. Are any of the factors or elements you just mentioned more important at different stages of a child's development, and, if so, how do they differ over time?

Uline believes these factors are generally important across all age groups. She stressed the importance of developmentally appropriate design and referenced Crow Island School as an example. Crow Island School, originally designed with John Dewey's philosophy of education in mind, was one of the first schools to take seriously the size of children it was meant to serve. The school was built to scale, and displayed attentiveness to the individual child, driving home the point of developmentally appropriate spaces. Uline also noted that as children get older, they have increasing desire to have some control over their space, and that design should promote independence and autonomy where appropriate.

If you were advising a philanthropic endowment with limited financial resources on the best strategy for transforming local spaces and places to promote the positive mental health of children, especially children from vulnerable populations:

What types of quality improvements of these places and spaces would you recommend it prioritize?

If we are talking about students who are from low SES who tend to attend school or daycare in facilities that are less than optimum: Bringing spaces up to some sense of adequacy is a big job in and of itself. Our research shows that

things as simple as cleanliness make a big difference. Cleanliness operated separately from all other variables we investigated. Poor kids attend schools that look different from the schools that wealthier kids attend. Upgrade facilities across dimensions of facility quality mentioned above.

What types of quality improvements are the most cost-effective?

It is possible to renovate education facilities in a cost effective manner that increases quality.

Aspects of the environment that have been most often shown to make a difference: light, A/C (those aspects that have a physiological impact on people); aesthetics (paint, artificial lighting, soft versus hard environments, introducing carpeting, flexible soft furniture); and spaces that are flexible enough to respond to kids' different learning styles.

Many of the project's key stakeholders have expressed concerns that children from vulnerable populations often lack access to places and spaces that effectively promote their social and emotional development. How might the endowment direct its focus to address this concern?

Focus on school facilities because children spend more time in school than in any other place with the exception of the home.

As part of this project, we plan to conduct case studies that examine places that have successfully promoted the mental health of children. Can you identify a few specific places and spaces that are especially effective at promoting children's positive mental health?

See Anne Taylor's book (below).

I would recommend that you focus on a range of places (Montessori schools, K-12 neighborhood schools, schools in museums, incredible shared use spaces).

Are there particular resources that I should be aware of?

- *Linking Architecture and Education,* Anne Taylor, New Mexico Scholar and Architect
- *School Design Together,* Ed. Pamela Wollmer

Appendix 1: Bibliography Sorted by Topic

Articles and reports are sorted into the following thirteen topics. The topics emerged as the literature review progressed. The research team noticed that some topics have been more heavily researched than others and that some have more of a basis in peer-reviewed articles. Two topics, Psychiatric Residential Treatment Facilities and Libraries, did not arise organically, but were deliberately searched. These two topics had come up in talks with stakeholders as possible places of interest. However, they do not have as much support in the literature as the other subjects.

Works noted with an asterisk were read carefully by the research team. Works without an asterisk received less careful evaluation but may be of use for future related projects.

General studies on the relationship between spaces/places and mental health

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* Indicates that the researchers contacted the organization or individual for an interview

Appendix 2: Interviewees and Prospective Interviewees

The following sections contain a list of experts whom the researchers interviewed and a list of experts who the researchers contacted but did not interview. The interviewers called and emailed prospective interviewees to make contact and schedule times to talk. After carrying out a robust set of interviews, the interviewers stopped contacting new prospective interviewees and reduced attempts to contact those who had yet to respond.

Interviewed

Gary Evans, Cornell University
College of Human Ecology
Department of Design and Environmental Analysis
Department of Human Development
http://www.human.cornell.edu/bio.cfm?netid=gwe1_

Nilda Cosco, NC State University
College of Design
Natural Learning Initiative
http://design.ncsu.edu/research/natural-learning-initiative

Patrick Brosnan (and Robin Randall), America's Schoolhouse Council
Board President, America's Schoolhouse Council
CEO of Legat Architecture
http://asc1.dreamhosters.com/

Andrea Faber Taylor, University of Illinois at Urbana-Champaign
Landscape and Human Health Laboratory
http://lhhl.illinois.edu/about.htm

Monica Pallett, The Little School at Duke
The Little School at Duke
http://www.thelittleschool.net/duke/staff/support-staff_

Russ Lopez, Boston University
Boston University
School of Public Health
http://people.bu.edu/rptlopez/

Ania Shapiro, U.S. General Services Administration (GSA)
U.S. General Services Administration (GSA)
GSA Child care Division
Child care Operations Center of Expertise
https://www.wbdg.org/wbdg_dgc.php

Kyle Snow, National Association for the Education of Young Children
National Association for the Education of Young Children (NAEYC)
Center for Applied Research

* Indicates that the interviewee prospect was contacted

Anne Taylor, University of New Mexico
University of New Mexico

Lisa Tolley, NC Department of Environment and Natural Resources
Environmental Education Program Manager
Office of Environmental Education and Public Affairs

Cynthia Uline, San Diego State University
National Center for the 21st Century Schoolhouse
San Diego State University

Prospective Interviewees[1]

*Peter Barrett, University of Salford
Salford Centre for Research and Innovation
p.s.barrett@salford.ac.uk

Thomas Barrie,[2] NC State University
College of Design
Director, Affordable Housing and Sustainable Communities Initiative
http://design.ncsu.edu/research/architecture-in-the-public-interest

Herbert Broda, Ashland University
Professor, College of Education
http://www.ashland.edu/coe/faculty-staff/dr-herb-broda

*Joe Frost, University of Texas at Austin
Professor Emeritus, Department of Curriculum and Instruction, College of Education.
http://www.utexas.edu/experts/joe_frost

Roger Hart, City University of New York
Director of the Center for Human Environments and the Children's
Environments Research Group at the Graduate Center
City University of New York
http://www.gc.cuny.edu/Faculty/Core-Bios/Roger-Hart

*Deborah McKoy, University of California Berkeley
Executive Director
Center for Cities & Schools
http://citiesandschools.berkeley.edu/staff-mckoy.html

*Myeta Moon, KaBOOM!
Director of Advocacy
KaBOOM!
https://kaboom.org/about_kaboom/staff/advocacy_community_engagement_

1 * Indicates that the interviewee prospect was contacted
2 On the Project Stakeholder Council

***Gary T. Moore, University of Sydney**
Emeritus Professor of Environment-Behavior Studies
School of Architecture, Design & Planning
http://sydney.edu.au/architecture/staff/homepage/gtmoore.shtml

***Robin Moore, NC State University**
College of Design
Director of Natural Learning Initiative
http://design.ncsu.edu/research/natural-learning-initiative

David Satterthwaite, International Institute for Environment and Development
International Institute for Environment and Development
www.iied.org

***Jennifer Sisak, NC Council of Educational Facility Planners**
President, NC Council of Educational Facility Planners, International (CEFPI)
Ratio Architects
http://www.cefpi.org/i4a/pages/index.cfm?pageid=3506

***C. Kenneth Tanner, University of Georgia**
Faculty of Engineering with a specialty in school design
cktanner@uga.edu

Appendix 2b: Framework for Interviews

Questions

1. What factors or elements of the physical and social environments in children's places and spaces have the greatest potential to influence the positive mental health of children?
2. Our project focuses on children ages birth to 5th grade. Are any of the factors or elements you just mentioned more important at different stages of a child's development, and, if so, how do they differ over time?
3. If you were advising a philanthropic endowment with limited financial resources on the best strategy for transforming local spaces and places to promote the positive mental health of children, especially children from vulnerable populations:
    a. What kinds of places and spaces would you recommend it focus on?
    b. To what extent would you recommend the endowment base its focus on the amount of time children spend in the place or space?
    c. What types of quality improvements of these places and spaces would you recommend it prioritize?
    d. What types of quality improvements are the most cost-effective?
4. Many of the project's key stakeholders have expressed concerns that children from vulnerable populations often lack access to places and spaces that effectively promote their social and emotional development. How might the endowment direct its focus to address this concern?
5. As part of this project, we plan to conduct case studies that examine places that have successfully promoted the mental health of children. Can you identify a few specific places and spaces that are especially effective at promoting children's positive mental health?
6. Are there particular resources that I should be aware of?
    a. Scholars or organizations with expertise in this area?
    b. Articles or books?
    c. Evidence-based standards and guidelines?
7. What's one question I didn't ask that you think I should ask going forward?

Appendix 3: Catalog of Exemplary Places

This catalog was compiled from sites recommended by interviewees, models referenced in the literature, and projects that have won awards or gained national recognition. Exemplary places tend to incorporate multiple aspects that have the potential to improve children's mental health. For example, a hospital space may include both a rooftop garden as well as an arts component. The researchers also took care to include spaces that attract vulnerable children and their families already. This way, the access barrier would be somewhat ameliorated. The researchers also emphasize exemplary models that already exist in Wake County, since it would be ideal for the John Rex Endowment's work to build upon the work and momentum already underway.

Outdoor Spaces

Boston Schoolyard Initiative, Boston, MA

The Boston Schoolyard Initiative is a public-private partnership between the City of Boston, Boston Public Schools and the Boston Schoolyard Funders Collaborative. The Boston Schoolyard Initiative website contains information, worksheets and templates to support the work of schoolyard committees, including meeting agendas, flyer templates and resources for engaging the schoolyard community in the schoolyard planning process.

www.schoolyards.org/

Imagination Playground at South Street Seaport, NYC, NY

Architect and designer David Rockwell has designed a space where children 12 and under can be the masters of their own universe. He has tapped the European tradition of adventure playgrounds, in which creative fun is prioritized over the exercise of gross-motor skills. "Play is how we explore the world," he says. "And so many great playground ideas have been edited out by overplanning."

The space's perimeter is a wooden runway in the shape of an infinity symbol. The area within is dominated by loose parts—mostly found objects, such as wheelbarrows, buckets, rope and large white sheets—and a truckload of foamy blue shapes manufactured by Rockwell's design team. There is also an abundance of sand and water. Although there will always be Parks Department--trained "play associates" on hand to oversee the loose parts, things are bound to get messy.

http://www.timeout.com/new-york-kids/things-to-do/imagination-playground-at-south-street-seaport

Same designer, similar space:

Betsy Head Park (newly planned playground), Brooklyn, NY

http://www.nytimes.com/2013/12/18/nyregion/in-a-brooklyn-park-design-movable-parts-at-play.html?_r=1&

Maryland Public Schools

In September 2010, the Maryland State Board of Education adopted new regulations (COMAR 13A.04.17.01 Environmental Education Instructional Programs Grades Pre-kindergarten to 12) that require all Maryland public school systems to provide a comprehensive multidisciplinary environmental education program infused with current curricular offerings. This program is aligned with the Maryland Environmental Literacy Curriculum. In June 2011, the Maryland State Board of Education adopted COMAR 13A.03.02.04 adding Environmental Education as part of the State graduation requirements.

Maryland public schools collaborate with the Maryland Association for Environmental and Outdoor Education.

Since 1985, MAEOE, a nonprofit educational association, has served thousands of teachers and students at all grade levels, natural resource managers, nature center staff, and environmental program managers with dynamic training programs, workshops, conferences, awards programs, networking opportunities, publications, and related resources.

http://marylandpublicschools.org/NR/rdonlyres/FCB60C1D-6CC2-4270-BDAA-153D67247324/32899/PlanningConstructingUsingSchoolCourtyards_062012.pdf

North Carolina Joint Use Agreements

North Carolina Department of Public Instruction and Division of Public Health (2012). Promoting Physical Activity Through Joint Use Agreements: A Guide for North Carolina Schools and Communities to Develop and Use Joint Use Agreements.

http://www.nchealthyschools.org/docs/home/use-agreements.pdf

Robin Moore, Raleigh, NC

Projects designed by Moore at NC State including:

- Bright Horizons Family Solutions Child Development Center, Research Triangle Park
- Environmental Yard, Berkeley, CA
- Nature Playscape, Cincinnati Nature Center
- Kids Together Park, Cary
- Blanchie Carter Discovery Park at Southern Pines Primary School

School and Child Care Spaces

Ann Reid Early Childhood Center, Naperville, IL

To make children feel at ease, the space was divided into a "learning village" of four educational neighborhoods that are connected to each other via communal areas and provide multiple opportunities for interaction. The corridors, or neighborhood "streets," have various instructional wall surfaces and built-in manipulatives, e.g., letter blocks on skewers in hallways.

The children at Ann Reid get a firsthand experience of the sustainable landscape design from windows that frame seating areas that are snuggled within the millwork and finished with cushions. Just outside the windows, rain is celebrated on stone pathways that follow sweeping curves to maximize the opportunity for infiltration before a last-stop catch basin.

The facility also includes windows along the lower wall in classrooms to allow light to enter and meet the district's intent to encourage students to be more engaged with nature.

http://www.schoolconstructionnews.com/articles/2011/08/17/early-education-center-uses-child-centered-design

Atrium School, Watertown, MA

This project called for the adaptive reuse of a brick warehouse on a limited site in a mixed industrial/residential neighborhood into a functional schoolhouse for an expanding, independent K-6 program. The transformation required rethinking the building's orientation relative to site and creating a playful interior sequence that breaks down the long and narrow building volume.

http://www.designshare.com/index.php/projects/atrium-school

Chicago Commons, Paulo Freire Family Center, Chicago, IL

Opened in 2001, the Freire center, named after the influential Brazilian educator, is operated by Chicago Commons, a group that offers a wide range of resources for residents in the city's poorest neighborhoods, from early childhood education programs to adult day care for the elderly.

The center and its federally funded education programs have been a "safe haven" in the neighborhood, which has experienced serious gang violence.

Like the other three family centers operated by Chicago Commons, the Back of the Yards facility operates under the Reggio Emilia approach to education, a method that prioritizes a child's involvement in their school surroundings, makes teachers "co-collaborators" and encourages parental involvement.

The building's hallways are lined with kids' "experience" projects, like a colorful canvas painted by brooms and art projects made from recycled materials.

The goal is to make the toddlers "school ready," and Chicago Commons leaders boast of the percentage of their students who've met or exceeded expectations for "kindergarten readiness."

http://www.dnainfo.com/chicago/20131023/back-of-yards/paulo-freire-family-center-safe-haven-back-of-yards

Child Care Center at Hort Woods, State College, PA

The Hort Woods Center curriculum is integrated with the Penn State College of Health and Human Development (HHD). According to Linda Reichert, Center director, "The HHD Family Studies students do full-time internships here, and School of Visual Arts students work with the kids on a variety of sustainable arts. The School of Music students also do activities with preschoolers every week. Kids get exposure to tap dancing, ballet and even traditional Irish dancing. We are very lucky to have the campus as an oasis of resources for child enrichment." It is a true living laboratory for Penn State.

The building has three natural, outdoor learning environments that were designed to accommodate the center's varying age groups. The first floor includes five classrooms for infants and toddlers, shared and common spaces, a multipurpose area called the "imagine-atrium," an atelier, a library and outdoor patios. The second floor includes five classrooms for preschool children, family gathering areas and library space. The building's sustainable design intentionally focuses on educating the young children who attend the center about the importance of conserving natural resources. The center's three natural playgrounds help young children get in touch with the natural environment. Features include a custom climber, pull-up bars, musical instruments, interactive water features and meandering pathways with special impact-absorbing surfacing material.

http://news.psu.edu/story/290932/2013/10/10/campus-life/penn-state-child-care-center-awarded-leed-platinum-certification

The Children's School, Stamford, CT

"This modified one-room schoolhouse for an established Montessori school is designed to support their child-centered teaching methodologies. The open space encourages the free movement of the child through different learning areas. Environmentally sensitive design features instill values of conservation and stewardship in the students" (from DesignShare.com).

http://www.designshare.com/index.php/projects/the-childrens-school/intro

Community Action Project, Tulsa, Oklahoma

Our method is to combine early childhood education of the highest caliber with innovative family financial and health services and targeted community improvement efforts.

The Community Action Project (CAP) of Tulsa is the largest anti-poverty agency in Oklahoma. We believe every family and every child deserves the same opportunity for success. This is achieved by empowering low-income families with the education and tools they need to break the cycle of poverty. CAP Tulsa provides the support and guidance with early childhood education and comprehensive enrichment programs for the entire family.

CAP Tulsa specifically focuses on a two generation approach that aims not only to prepare young children for future success in school, but also their parents through programs designed to increase parenting skills, employability and earning potential. Our goal is that children enter school prepared for success, families create a nurturing and secure environment for their children and that families are connected to one another.

http://captulsa.org/about-cap/

First National Child Development Center, Omaha, NE

Our Child Development Center espouses a child-centered philosophy of teaching and learning. It is based on the premise that each child is an individual with a unique pattern of development capabilities, temperamental characteristic and learning styles. Our roots and commitment to a child centered philosophy lie in our respect for the "specialness" of young children and our collective delight in the unfolding wonders of their growth and development. Small group sizes, intensive teacher child ratios, and highly qualified and trained faculty provides assurance that each child receives individual attention and a sense of belonging. The facility has over 100 square feet per child of interior space-exceeding national and state licensing standards. Spacious muscle play areas with interior slide and riding toys, also used for parent events or large meetings, are attractive to children, parents, and faculty. Lare "window box" seats bring the outdoors indoors. There are platform loft areas for dramatic play, science exploration, and storybook time. Outdoor playgrounds designed for each age group with multiple zones, safety surfaces, interesting trike paths, climbers and sand/ water play features. Interior water room that is interactive and available all year round.

http://www.designshare.com/index.php/projects/first-national-child-center/narratives

Fuji Kindergarten, Tachikawa, Tokyo, Japan

The oval-shaped building makes full use of the tight urban site. The design maximizes the space available for secure but unconstrained play and child development in line with Montessori principles, with a roof deck running around the entire single-story structure and a large enclosed central courtyard. Three mature trees have been incorporated into the building, protruding through the roof to form a green canopy that provides welcome shade for part of the roof deck in summer. The school has been designed to allow children to mix and move around at will. There are no fixed walls between the classrooms, and children can move between class groups. All furniture can be easily rearranged to accommodate different group sizes and different activities. As well as chairs and desks for the children, there are many wooden boxes that are used to partition smaller areas or to provide additional benches for seating. For most of the year, the large sliding screens that form the inner wall of the building are pushed back, opening up the interior spaces to the sheltered courtyard in the center of the school. In the winter, when the sliding wall screens remain closed, the rooms are kept warm using an underfloor heating system. Lighting can be adjusted using ceiling-mounted pull cords.

http://edfacilitiesinvestment-db.org/facilities/9

Great Beginnings Early Education Center, Lee's Summit, MO

Excellent educational programs are seldom the result of a building alone; however, through the cooperative efforts of a diverse group of participants the center was a natural. Spawned by a private donation, the School District was challenged to provide a much needed new facility for Parents As Teachers and Early Childhood Education so the staff members can work side-by-side and share employee resources and facilities in order to best serve children and families.

The new facility doubles the amount of space dedicated to these programs. Central to the facility is an entry lobby with clerestory windows, a spacious multi-purpose room, offices and therapy spaces. To the south are twelve classrooms for the physically or developmentally delayed children accepted into the Early Childhood program. The design promoted the use of shapes and colors for way-finding to provide a recognizable element for students. The Parents As Teachers program is to the north and contains thirty-six individual work stations for parent educators in an open workstation concept to maximize staff interaction.

Parents As Teachers (PAT) is a home/community/school partnership designed to support parents in their parenting role. This free, voluntary program provides personal visits from certified parent educators who are trained in early childhood development. They assist parents in recognizing and discovering the seven developmental stages in their child's life and in discovering any conditions that might hinder their child's development. Last year nearly 10,000 family visits were made by 34 parent educators in Lee's Summit. Additionally, PAT provides other services including developmental screenings, parent group meetings, teen parent groups, and special programs for children with disabilities, English as a Second Language families, and single-parent households.

Combining these two programs in a shared facility allows more children to be served, and provides greater staff flexibility and collaboration. Despite the challenges along the way, the end result is a cohesive facility harmoniously blended into a park setting providing an enriching educational environment.

http://www.designshare.com/index.php/projects/great-beginnings-early-education-center/intro

Harris Family Children's Center, Exeter, NH

This facility incorporates principles from the Reggio Emilia schools in Italy. It provides extraordinary early education for the faculty and staff children of a secondary school in New England. Sited on 15 landscaped acres, the center provides wonderful outdoor as well as indoor learning experiences for infants to five years.

http://www.designshare.com/index.php/projects/harris-family-childrens-center/intro

Head Start at Windermere, East Cleveland, OH

The concept of the site location places a federally funded Early Education Facility near public transportation. A parent or guardian dependent on public transportation could walk their child from the transit station to the facility and proceed on public transportation to their place of work. This necessitated constructing an extension of the existing canopies. To keep the walking distance to a minimum, the front entry of the facility does not face south to main avenue but to the north nearest the station. The reversal of street engagement required that special attention be paid to the rear of the building which fronted the street and to indicate the actual entry to the building.

http://www.designshare.com/index.php/projects/head-start-at-windermere/images

J. Lyndal Hughes Elementary School, Roanoke, TX

The school is in Northwest ISD, near Fort Worth, TX. It was the first in a series of schools built from the districts' most recent prototypical design. The school is efficient, innovative, inviting and functional. Designed to house 650 students, grades K-5, one of this school's standout features is the garage door-like overhead panels that separate classroom spaces from the "flex spaces" that connect two classrooms. Another innovative feature is the cafeteria space

that opens up to become a performance stage, allowing the room to double as an auditorium. This feature extends the capabilities of room beyond students and teachers to become an event facility for the community at large. The school's predominant feature — in the corridors, classrooms, offices and assembly/public spaces — is its transparency and flood of natural light. The result is an open, welcoming and secure environment that is both a neighborhood school and a community multi-purpose facility.

http://www.designshare.com/index.php/projects/lyndal-hughes-elementary-school

Mothers' Club Family Learning Center, Pasadena, CA

Two-Generation Learning means that parents and children simultaneously acquire new skills and knowledge that result in positive outcomes for both generations. Research demonstrates that increasing the education levels of parents increases learning outcomes in children. Research also shows that children from low-income families do better in school if they participate in high-quality early childhood programs that require intensive parent involvement.

Mothers' Club is the only agency in Pasadena offering a dual generation approach to at-risk children and their parents. Our high-quality early childhood education requires active parent participation and is consistently ranked among the top programs in the region. Our holistic services for parents include English as a second language classes, parenting education, mental health support, family literacy, computer training, kindergarten transition, health & wellness, and much more.

http://www.designshare.com/index.php/projects/mothers-club-family-learning-center

PK Yonge Developmental Research School, Gainesville, FL

"A unique & progressive community on a beautifully wooded site. The school's prized possession is their Tumblin' Creek, which is not only the heart of the campus but also a threshold between the primary and secondary campuses. The elementary school is situated alongside the creek, taking advantage of the views and the shade from the existing, mature trees. The main drop-off point is at the north side of the campus - students will then descend down ramps and stairs, following the site's topography to the main entrance that is at the center of the school. The double-height main entrance commons is open & welcoming, connecting all three of the Small Learning Communities: Kindergarten & 1st Grade (ground level west wing), 2nd & 3rd Grades (ground level east wing), and 4th & 5th Grades (second level). The focus of the school's design is to be respectful to the beautiful site that it sits on and to strive towards the highest environmental sustainable standards. This school, with planning and design work by Fielding Nair International, exemplifies a 21st century learning community. This video shows how the curriculum and learning at the school is impacted by the space they are practiced in" (from DesignShare.com).

http://www.youtube.com/watch?v=NT7Sy9APTPo&feature=youtu.be

Ruth Staples Child Development Center, Lincoln, NE

The Ruth Staples Child Development Laboratory is a high quality children's program where college students train to be teachers and scholars learn more about young children through research. Our nationally accredited program offers full day child care services for children eighteen months through five years. As a teacher training facility, university students take an active role in the classrooms by planning, implementing, and evaluating activities with the children, under the supervision of our outstanding faculty.

In addition to our classrooms children can visit specialized areas such as our indoor wading pool or art studio. Children have daily outdoor play in our spacious, state-of-the-art playground, and the Angeline Anderson Children's Garden. The Garden provides opportunities for children to observe, wonder, and marvel in their relationship with nature.

http://cehs.unl.edu/cyaf/outreach/staplesLab.shtml

Tacoma Community College's Early Learning Center, Tacoma, WA

A comprehensive approach to early learning center design considers the educational priorities of three groups. First are the young children, supporting their learning in appropriate ways at the very earliest age. Second are the young adults who, as new parents or before they become parents, need to be educated about child development and parents' important role in it. Third are the practitioners and providers who need to be well educated and updated regularly on the latest research and best practices.

Early learning center designs should have an integrated focus on children, parents and practitioners. The facility, which serves up to 116 children, includes classrooms for infants, toddlers and preschoolers. There is a resource room where parents can study and consult about guiding their child's learning progress.

Classrooms are paired to share storage, food prep and toileting/changing facilities. Each pair of classrooms has a shared project area for messy activities like crafts and eating, with direct access to outdoors.

http://www.djc.com/news/co/12020008.html

Healthcare Spaces

University of Wisconsin's American Family Children's Hospital, Madison, WI

American Family Children's Hospital is a comprehensive pediatric medical and surgical center featuring nationally recognized pediatric specialists in fields from Cardiology to Cancer, including faculty from the University of Wisconsin School of Medicine and Public Health's Department of Pediatrics.

http://www.uwhealthkids.org/patient-guide/when-you-arrive/35284

Nemours Children's Hospital, Orlando, FL

Nemours is one of the largest integrated pediatric health-care systems in the United States. The nonprofit children's health organization provides primary, hospital, and clinic-based specialty care, prevention and health information services, and medical education programs in Delaware, Florida, New Jersey, and Pennsylvania. It also conducts research with a broad reach.

Design includes

- Floor-to-ceiling views of nature
- Children can control the color of lights in their hospital rooms
- Concierge-like greeters
- Rooftop garden

http://www.ideo.com/work/experience-design/

Phoenix Children's Hospital, Phoenix, AZ

The "big idea" for the campus is to create a welcoming oasis that provides shade and healing while emulating the natural beauty of the surrounding mountains and desert.

The campus is organized around north/south and east/west axes to promote logical way-finding throughout the campus. Distinct color palettes, animal sculptures and digital nature photographic wall covers also help with way-finding.

Ambulatory and inpatient functions are combined into one tower. Innovative stacking improves family orientation, reduces patient and staff travel distances and facilitates logical campus groupings.

A landscaped rooftop garden – decorated with oversized planters and located on the third floor – provides a play area, outdoor dining and lounge seats for patients, families and staff.

http://www.hksinc.com/insight/seeing-the-benefits-of-great-childrens-hospital-design/

Award-Winning Spaces

American School Board Journal, Learning By Design Awards Winners (see link for example)

http://issuu.com/stratton/docs/fall_2010?mode=embed&layout=http%3A%2F%2Fskin.issuu.com%2Fv%2Flight%2Flayout.xml&showFlipBtn=tru

Architectural Portfolio Citation Winners

http://schooldesigns.com/Architectural-Portfolio.aspx

Innovative Learning Environments: Design Awards Meet Research-Evidence

http://www.brikbase.org/sites/default/files/aia_cae_researchscholar2012.pdf

OECD's Designing for Education: Compendium of Exemplary Educational Facilities 2011

Showcases over 60 recently built or refurbished educational facilities from 28 countries. Collectively, these projects demonstrate state-of-the-art design in this field and each one is lavishly illustrated with color photos, plans and descriptions.

http://www.oecd.org/education/innovation-education/centreforeffectivelearningenvironmentscele/designingforeducationcompendiumofexemplaryeducationalfacilities2011.htm

Appendix 4: Organizations Working in Policy Areas Relevant to Children's Places and Spaces

The researchers identified the organizations in this section through conversations with interviewees and through resources from the National Clearinghouse for Educational Facilities website, which is no longer active. Similar information is available at the Education Facilities Clearinghouse website . This list is by no means exhaustive but helped to clarify resources and prospective interviewees. Note that many of the descriptions in this section are direct quotes from each organization's web site.

*America's Schoolhouse Council

National consortium of educational planners and designers dedicated to improving student learning through better academic facilities.

BEST: Building Educational Success Together

BEST is dedicated to expanding the effectiveness of those working to improve outcomes for children in urban public schools, focusing on the need for healthy, safe, and educationally adequate schools that are community anchors and are built and maintained in a fiscally and environmentally responsible manner.

Center for Cities and Schools. University of California, Berkeley

The Center is committed to bridging the fields of education and urban policy to create equitable, diverse, and livable cities and schools. The Center works to promote understanding of how the varieties of natural and built environments are related to school quality. This is done through investigating issues around land use policies that support quality schools, coordinating school and housing policy, and thinking outside the box of traditional school facilities. The website includes research, resources, news and events

Centre for Effective Learning Environments

In January 2009, OECD's Programme on Educational Building became the Centre for Effective Learning Environments. CELE promotes the exchange and analysis of policy, research and experience in all matters related to educational building. CELE members consist of individual governments and research agencies throughout the world. Its work is of relevance to policy-makers in national and regional authorities responsible for educational facilities, to architects, system level and institutional managers, and to researchers in the field.

Center on the Social and Emotional Foundations for Early Learning at Vanderbilt University

The Center on the Social and Emotional Foundations for Early Learning (CSEFEL) is focused on promoting the social emotional development and school readiness of young children birth to age 5. CSEFEL is a national resource center funded by the Office of Head Start and Child Care Bureau for disseminating research and evidence-based practices to early childhood programs across the country.

Children's Environments Research Group

The Children's Environments Research Group (CERG), links university scholarship with the development of policies, environments, and programs to fulfill children's rights and improve the quality of their lives. There are two major strands to our work. The first is a broad concern with the fulfillment of children's rights. The second is a more specific focus on the planning, design and management of children's physical environments.

* Indicates that the researchers contacted the organization for an interview

Children, Youth, and Environments Journal

CYE facilitates the dissemination of knowledge and stimulates discussion in support of inclusive and sustainable environments for children and youth. The peer-reviewed online journal publishes papers on a broad range of topics using different approaches, including quantitative and qualitative empirical research, theoretical, methodological and historical investigations, critical literature reviews, design analyses, post-occupancy evaluations, policy studies, and program assessments.

Collaborative for High Performance Schools

CHPS's mission is to facilitate the design, construction, and operation of high performance schools: environments that are not only energy and resource efficient, but also healthy, comfortable, well lit, and containing the amenities needed for quality education.

Council of Educational Facility Planners, International (CEFPI)

An international non-profit organization and source of information for building, renovating, and evaluating schools in order to create optimum educational facilities

Department of Health and Human Services - Head Start Facilities

Assists program directors and facilities managers with planning and designing Head Start and Early Head Start centers

DesignShare

DesignShare is the central address for the very best in educational facilities and their impact on the learning process. DesignShare provides an invaluable service as a facilitator of ideas and resources about best practices and innovation in schools from early childhood through the university level. Since 2000, over 400 case studies have been collected that showcase the most innovative learning environments from over 30 different countries.

*The International Making Cities Livable Council

IMCL is an interdisciplinary, international network of individuals and cities dedicated to making our cities and communities more livable.

The Making Cities Livable movement promotes True Urbanism, the time-tested principles of appropriate human scale architecture, mixed use shop/houses, and a compact urban fabric of blocks, streets and squares. Outdoor cafes and restaurants, farmers' markets and community festivals also enliven the public realm.

The principles of True Urbanism create a "city of short distances" where balanced transportation planning makes possible commuting via pedestrian networks, bicycle networks, traffic-quietened streets and public transportation. A measure of the city's livability is how good it is for children and youth. If a city lacks livability, they are the first to suffer. A city built on True Urbanist principles provides the ideal environment for the physical, mental and social development of children and youth.

IMCL provides consultation services on the topic of Child-Friendly Communities: The IMCL team offers an innovative approach to evaluate the impact of the built environment on the social and physical health of children and youth in your city or neighborhood, and to identify – with involvement of the community - the most effective ways to improve health and well-being through strategic interventions in the built environment.

*KaBOOM!

KaBOOM! is a national non-profit dedicated to saving play for America's children. Our mission is to create great play spaces through the participation and leadership of communities. Ultimately, we envision a place to play within walking distance of every child in America.

National Association for the Education of Young Children

NAEYC's mission is to serve and act on behalf of the needs, rights and well-being of all young children with primary focus on the provision of educational and developmental services and resources. NAEYC's website includes publications on caring spaces, learning places, children's environments that work, natural spaces for children, etc.

Education Facilities Clearinghouse

The Education Facility Clearinghouse program (EFC) was awarded to the Graduate School of Education and Human Development at the George Washington University by the U. S. Department of Education on October 1, 2013. The EFC was originally established in 1998. The purpose of the Education Facilities Clearinghouse is too collect and disseminate research and other information on effective practices regarding the planning, design, financing, procurement, construction, improvement, operation, and maintenance of safe, healthy, and high-performing facilities for Pre-K through higher education.

*National Institute of Building Sciences

The National Institute of Building Sciences is a non-profit, non-governmental organization that successfully brings together representatives of government, the professions, industry, labor and consumer interests, and regulatory agencies to focus on the identification and resolution of problems and potential problems that hamper the construction of safe, affordable structures for housing, commerce and industry throughout the United States. Authorized by the U.S. Congress, the Institute provides an authoritative source and a unique opportunity for free and candid discussion among private and public sectors within the built environment. The Institute's mission to serve the public interest is accomplished by supporting advances in building sciences and technologies for the purpose of improving the performance of our nation's buildings while reducing waste and conserving energy and resources.

*Natural Learning Initiative at North Carolina State University

The purpose of the Natural Learning Initiative is to promote the importance of the natural environment in the daily experience of all children, through environmental design, action research, education, and dissemination of information.

*School Design and Planning Laboratory (SDPL) at the University of Georgia

SDPL's mission is to advance the design and planning of safe, comfortable, developmentally appropriate learning environments for primary, elementary, middle, and high schools.

*School Design Research at College of Design, North Carolina State University

Current learning styles and teaching methods suggest the need for a new form of learning environment, and changes in the facility planning process where active collaboration is needed to reflect the diverse expertise of all stakeholders in the school community.

The Third Teacher +

The Third Teacher+ is an educational design consultancy within the global architecture firm, Cannon Design. We're a multidisciplinary group that looks at the whole picture, the whole ecology of learning. We design learning environments and use design thinking to strategize cultural, pedagogical and organizational change with clients. We believe that design can be a powerful driver of organizational learning and change. Our process is human-centered, connection seeking, experiential, and iterative. We believe that this approach and mindset is crucial to uncovering who we are as organizations, communities, and cultures and shaping who we want to become. Our process helps us facilitate authentic and holistic conversations on change. The design of places and spaces helps make manifest these shared values and empowers communities to learn, work, play, create, and connect more richly. The Third Teacher + in action: http://www.edutopia.org/remake-your-class-collaborative-learning-video

* Indicates that the researchers contacted the organization for an interview

Appendix 5: Tools for Evidence-Based Guidelines, Assessment and Measurement

Gary T Moore. The Children's Physical Environments Rating Scale (CPERS5)

"The purpose of this scale is to provide a scientifically reliable and valid assessment instrument that can be used easily by early childhood educators, architects, landscape architects, other designers, policy makers, and regulators to assess the quality of the physical environment of child care, preschool, kindergarten, and other early childhood education facilities.

The Children's Physical Environments Rating Scale (CPERS) can be used for quality assessment, post-occupancy evaluation, fundamental research, and comparative cross-country research on the environmental quality of early childhood education facilities. The scale can be used to provide systematic evaluative information to inform policy makers, managers, childhood educators, architects, and parents. The scale can also serve as a shorthand design guide for the programming (briefing), design, and pre-occupancy design evaluation of new centers, or the renovation of existing buildings."

http://www.acefacilities.org/RetrieveDocument.ashx?DocId=107eafb6-2422-4460-8236-4ef10aec3ec9

A Practical Guide to Planning, Constructing, and Using School Courtyards. Maryland State Department of Education School Facilities Branch, Jul 24, 2012

"The Maryland Department of Education guideline for courtyard design is for use by local planning committees and architects in designing new schools and developing major renovation/addition projects. This guide also will be useful to school systems, school-based staff, and parent/community groups seeking to revitalize and make better use of existing courtyards. It includes recommendations for building and plant materials; safety and security; size, volume, and orientation; construction, accessibility, maintenance, and code compliance. The guide is illustrated with numerous color photographs, diagrams, and examples from Maryland and around the world. It documents the benefits of school courtyards, including: letting natural light and ventilation into classrooms; providing a safe, contained, outdoor area for instruction; supporting environmental education programs; and offering opportunities for creative, hands-on educational activities.

In September 2010, the Maryland State Board of Education adopted new regulations (COMAR 13A.04.17.01 Environmental Education Instructional Programs for grades Pre-kindergarten to 12) that require all Maryland public school systems to provide a comprehensive multidisciplinary environmental education program infused with current curricular offerings. This program is aligned with the Maryland Environmental Literacy Curriculum. In June 2011, the Maryland State Board of Education adopted COMAR 13A.03.02.04 adding Environmental Education as part of the State graduation requirements."

http://marylandpublicschools.org/NR/rdonlyres/FCB60C1D-6CC2-4270-BDAA-153D67247324/32899/PlanningConstructingUsingSchoolCourtyards_062012_.pdf

Lackney, 2000. Thirty-Three Educational Design Principles for Schools & Community Learning Centers

Educational Design Institute. This research is sponsored by the National Clearinghouse for Educational Facilities (NCEF).

The intent of this document is to provide a framework of educational design principles from which educators and design professionals can structure the content of their educational facility development process, from the earliest

strategic and educational planning stages right through to design, construction, occupancy and facility management.

The thirty-three educational design principles encompass the body of knowledge concerning well-designed learning environments. These principles are derived from a variety of sources: from the reflective practice of educators and design professionals to the empirical research of environmental psychologists and educational researchers. Each educational design principle embraces an underlying premise that all learning environments should be learner-centered, developmentally- and age-appropriate, safe, comfortable, accessible, flexible, equitable and cost effective. The premise interwoven through all principles should be understood to moderate the appropriateness of each principle in practice.

The ultimate goal of applying the 33 principles to school design is to optimize the school and its surrounding community as an effective setting for learning. No single school building process will be able to address and implement all of these principles; some may not apply to the situation, others might not be appropriate due to budgetary limitations. For example, school size research suggests we build learner groupings of 100; however, building a school this small may not be cost effective. Therefore, other principles may need to be employed in combination to meet this principle, such as the principle of creating schools within schools. The objective in using this book as a design guide is to consider as many of these principles as are appropriate. The principles are divided into educational facility planning and design process principles, principles for site and building organization, principles for primary educational space, principles for shared school and community facilities, and community spaces, principles related to the character of all spaces, and principles related to site design and outdoor learning spaces.

http://faculty.arch.tamu.edu/rjohnson/courses/StudioF05/33SchoolDesignPrinciples.pdf

Moore, Robin. The Preschool Outdoor Environment Measurement Scale (POEMS)

The Preschool Outdoor Environment Measurement Scale (POEMS) was developed as:

- A checklist for child care teachers/caregivers and administrators interested in learning more about creating higher quality environments for children's outdoor play and learning .
- A checklist for directors and program administrators planning quality outdoor environments for young children or those who are working to improve their existing space.
- A reference tool for landscape architects and designers working with child care programs to design quality outdoor play and learning spaces.
- A guideline for new construction of child care facilities.
- A reference tool for funding agencies supporting healthy, high-quality outdoor play and learning environments for children.
- A source of guidance for policy initiatives in early childhood development.
- A research instrument to study the implications of outdoor environmental quality in children's development and learning.

http://www.poemsnc.org/

National Association for the Education of Young Children (NAEYC) Accreditation Standards and Criteria

There are ten program standards, with specific criteria attached to each, which programs must meet in order to achieve NAEYC Accreditation. The framework of the standards and criteria focus on best practices in the field and the benefits to stakeholders in early childhood education.

- Standard 1: Relationships
- Standard 2: Curriculum
- Standard 3: Teaching
- Standard 4: Assessment of Child Progress
- Standard 5: Health
- Standard 6: Teachers
- Standard 7: Families
- Standard 8: Community Relationships
- Standard 9: Physical Environment
- Standard 10: Leadership and Management

http://www.naeyc.org/academy/primary/standardsintro

Sanoff, H. (1995). Creating environments for young children. Raleigh, North Carolina State University.

The planning and design of child care centers has been undertaken without sufficient knowledge of children's spatial behavior, resulting in centers not providing appropriate physical conditions for young children's developmental needs. Research suggests that physical environment is important in supporting child development. Child care settings convey silent messages about the intentions of the caregivers and administrators, which can also influence children's behavior. The physical space requirements and activities of the preschool environment should reflect person-environment relationships which meet children's needs for personal space and privacy. This workbook contains exercises and other learning materials for young students that follow principles of good design. The book contains the following units: (1) "Goal Setting"; (2) "What Is a Learning Environment," including components of a learning center, along with how to create and rate learning centers; (3) "Playroom Design Principles," focusing on light and color, planning, and modeling the playroom; (4) "Building Image"; (5) "Planning the Facility"; and (6) "Planning Outdoor Play," including play zones, planning outdoor play (POP), playground safety, playground document scale, and mapping children's behavior. (Contains 103 references.)

Appendix 6: Literature Review Methodology

Methodology

This literature review identified over 200 relevant sources from peer-reviewed journals, books, and reports from governmental organizations, advocacy groups, dissertations, and web-based resources. The review targeted the most recent literature (post-2000), but includes systematic literature reviews that cover earlier periods, as well as some often-cited pre-2000 works. The review supplemented findings from quantitative and qualitative studies with interviews of expert scholars and practitioners in environmental psychology, architecture and design, urban planning, public health and early childhood education. (For a list of interviewees and questions, please see Appendix 2.) Research was sorted and cross-referenced into the following subgroups:

1. General studies on the relationship between spaces and places and mental health
2. Arts/Design
3. Children's participation in the design process
4. Community design
5. Hospital design
6. Housing
7. Early childhood centers and schools
8. Libraries
9. Lighting
10. Noise
11. Outdoor spaces
12. Psychiatric Residential Treatment Facilities
13. Urban environments

Key Search Words & Phrases

1. "Creating places and spaces that promote children's positive mental health"
2. "Positive mental health spaces children"
3. Built environment
4. Social emotional development
5. Mental health
6. Child development
7. Environmental psychology
8. Design AND child-care centers OR preschools OR hospitals Or playground
9. Physical environment
10. Outdoor spaces
11. Participation AND design
12. Healing environments
13. Accessibility and Universal Design
14. Ambient features of spaces (e.g. crowding, noise, natural light, air quality)

Sources Used to Identify Relevant Literature

1. Proquest Database
2. Peer-reviewed literature reviews
3. Education Full-Text Database
4. Google Scholar
5. Websites of organizations working this area
6. Governmental reports
7. Works cited in relevant articles and books
8. Recommendations through books
9. Interviews with leading experts in the field