Repositioning Children’s Developmental Needs in Space Planning: A review of connection to nature

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Abstract

The past few decades have shown that the opportunity for children to have a direct connection with nature and outdoor environment declined due to rapid urbanization. Children are facing various physical and health problems as consequences from this phenomenon. This paper presents a review on benefits of nature on children’s developmental needs. The review also highlights children’s experiences in nature and effects of disconnection from the nature. In summary, it is crucial to understand children’s view towards nature and environment in creating spaces that reconnect them with nature. Designing for children today is indeed designing for the future, as well.

1. Introduction

In recent years, there has been a growing interest in the study on the contribution of nature to the quality of life for individuals and communities. Studies on children and nature have demonstrated that nature benefits children’s development. The rapid growth of urban population mostly occurs in developing countries across the world, however, has reduced children’s direct connection with nature (Freeman & Tranter, 2011; Louv, 2005). Previous studies have shown that children’s experiences in the outdoor environment are rapidly declining (Clements, 2004; Gaster, 1991; Karsten, 2005), where later diminish children’s experience in nature (Kellert, 2002, 2005; Louv, 2005). Children’s leisure trends have
changed from actively involved in outdoor activities with nature to passively confined to indoor activities, aided with gadgets (Louv, 2005; Veitch, Bagley, Ball, & Salmon, 2006).

Factors that limit children’s connection with the outdoor environment, where nature exists include parents control due to concern on their children’s safety (Prezza, 2007), and because they are involved in scheduled activities in daily lives (Rosenfield & Wise, 2001). Physical environment such as design qualities, safety and level of affordances are another factor that cause the decline in the children’s experience in the outdoor environment and nature (Aziz & Said, 2011). Trends in built environment seem to give little priority on children’s developmental needs.

The phenomenon of the disconnection with the natural world leads to changes in children’s quality of life which has been coined by Louv (2005) as “Nature Deficit Disorder”. Disconnection with the nature gives adverse effects on children’s developmental needs. Thus, it is important to understand benefits of the nature and environment on children developmental needs in order to create an environment that meets their needs.

This paper presents a synthesis of studies from mid-1990s to 2013 on benefits of nature to children’s developmental needs. The review also includes experience in nature and disconnection with the nature. The aim of this paper is to provide a comprehensive understanding on the importance of nature for children that should be adapted in the environment.

2. Methodology

Literature searches on benefits of nature on children’s developmental needs were conducted from online databases include Science Direct, SAGE, JSTOR and Taylor. Using the keywords: children, nature, natural environment, connection and experience, related journals were identified. The journals consist of different disciplines: children’s environment, environmental psychology, health and place, environment and behaviour, environmental education and landscape architecture.

Theoretical, review and empirical papers related to benefits of nature, experience in nature and disconnection with nature were selected from those published between mid-1990s and 2013. The review emphasizes on the benefits of nature on children’s developmental needs and categorized them in cognitive, physical, social, emotional and spiritual development. The review also highlights children’s experiences in nature and the effects of their disconnection with the nature.

3. Results

Studies on the benefits of nature on children have been done through various experience and contact with nature. Children experience the nature in three types of contact which are direct, indirect and vicarious or symbolic experience. Direct experiences in nature involve actual contact with natural settings through exploration, play and activities in green areas and wildlife without human control (Freeman & Tranter, 2011; Kellert, 2002). On the other hand, indirect experiences in nature occur in organized and planned areas such as botanical garden, zoos, nature centres and museums with human control. It can also be done through gardening, cultivating crops and orchard, as well as, interacting with natural elements that require human control and management. Vicarious or symbolic experiences occur through visual and verbal interface explaining the nature with the absence of actual contact. It includes experience from electronic media: television and computer, in written communication from books and magazines or learning in a classroom (Kellert, 2002).

Freeman and Tranter (2011) also categorized the experience in nature in three types: direct, indirect and observe without contact, but with a different meaning for indirect experience. Indirect experiences have been described by Freeman & Tranter (2011) as contact through media, internet, books and stories,
which are the same as vicarious experience defined by Kellert (2002). Observation without contact involves view through window, car or other way that could provide sightings to the nature (Freeman & Tranter, 2011). In a recent study, experience in nature has been divided into two: direct and indirect. Indirect experience combines both indirect and vicarious experience (Duerden & Witt, 2010).

Each experience contributes to children’s developmental needs. According to Kellert’s modes of learning, experience in nature contributes to children’s cognitive, affective and evaluative development (Kellert, 2002). This paper explains the benefits of experience in nature in two types: direct and indirect (combination of indirect, vicarious and observe without contact experience).

3.1. Children’s disconnection with nature

The scenario of children’s disconnection with nature and outdoor environment gives negative effects on children’s development and well-being. Nowadays, children are facing various health issues, and obesity is the main physical problem facing by today’s children (Å & Yilmaz, 2008). Other than obesity, children are also facing Attention Deficit Disorder (ADD), Attention Deficit Hyperactive Disorder (ADHD) and vitamin D deficiency. Moreover, separation between children and nature also contribute to cognitive and attitudes problems. Staying indoors with long exposure to a television screen and other electronic gadgets affect children’s language and cognitive development (Jusoff, 2009).

Children with lack of experience and exposure with nature will see themselves separated from the natural world. They will have ‘bio phobia’ defined as negative affiliation towards nature (Wilson, 1984). Studies on children’s perception on the nature described that children express negative feelings and have misconceptions about the natural environment when they have less real contact with living things and obtain most of experience through the electronic media (Cohen & Horm-Wingerd, 1993). Children convey more expressions of fear and dislike than appreciating, caring or enjoyment towards the natural environment especially with wild nature (A Simmons, 2006). As a consequence, children will treat nature as something to be controlled rather to be protected and preserved.

Disengagement of children from nature will further disconnect them from nature in adulthood later. In retrospective studies, adult attitude towards nature is significantly influenced by their experiences in nature during childhood. Adult, who have experiences in nature during childhood have interest in nature based recreation activities, visiting green areas and concern for the natural world (Chawla, 2007; Thompson, Aspinall, & Montarzino, 2007; Wells & Lekies, 2006). Lack of knowledge of the environment is another consequence from the disconnection with the nature. Urban children in a study on perceptions of river landscapes show little understanding of the functions that living and decaying riverside vegetation might have in river ecology, indicating a lack of direct and indirect experience in the nature (Tunstall, Tapsell, & House, 2004).

A generation who appreciates nature, green areas and landscape will cease to exist if the trend of ‘Nature Deficit Disorder’ among today’s children continue. Hence, it is crucial to create environment and spaces that provide opportunities for children to have contact with nature in their daily life for the sustainability of future generation.

3.2. Benefits of nature on children’s developmental needs

Researchers from different range of disciplines include education, psychology and landscape design have described the importance of nature on children. The literatures in environment and behaviour, environmental health, environmental education and environmental psychology, have demonstrated that connection, experience and engagement to nature have positive effects on children’s cognitive, physical, social, emotional and spiritual development. Biophilia hypothesis explains the relationship between
nature and children’s needs. It indicates human have an innate affinity for nature and need nature for aesthetics, intellectual, cognitive and spiritual meaning (Kellert & Wilson, 1993).

In developmental psychology, children are divided into toddlerhood, early childhood, middle childhood and adolescence. This review highlights benefits of nature on children in every stage except toddlerhood, which involves direct and indirect engagement in different settings such as home and neighbourhood (Corraliza, Collado, & Bethelmy, 2012; Prezza et al., 2001; Taylor, Kuo, & Sullivan, 2002; Wells & Evans, 2003; Wells, 2000), preschool and school (Arbogast, Kane, Kirwan, & Hertel, 2009; Collado & Corraliza, 2012; Corraliza et al., 2012; Ernst & Monroe, 2006; Matsuoka, 2010; Roe & Aspinall, 2011) and also direct engagement through nature camp and recreation activities in wild nature (Bixler, Floyd, & Hammitt, 2002; Collado, Staats, & Corraliza, 2013; Larson, Green, & Castleberry, 2009; Said, 2012; Thompson et al., 2007; Wells & Lekies, 2006).

Researchers also have explored the benefits of nature to children with disabilities such as Attention Deficit Disorder (ADD) and Attention Deficit Hyperactive Disorder (ADHD) (Kuo & Taylor, 2004; Taylor, Kuo, & Sullivan, 2001; Taylor & Kuo, 2009).

Table 1. Trend of studies on benefits of nature to children’s developmental needs

<table>
<thead>
<tr>
<th>Benefits of nature on developmental needs</th>
<th>Years</th>
<th>Authors</th>
<th>Description</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Taylor et al. (2001), Kuo &amp; Taylor (2004), Taylor &amp; Kuo (2009)</td>
<td>Studies focused on benefits to nature on children with disabilities ADD and ADHD</td>
</tr>
<tr>
<td>Social</td>
<td>2000-2009</td>
<td>Prezza et al. (2001), Bixler et al. (2002), Arbogast et al. (2009)</td>
<td>Studies demonstrated direct experience in nature benefits on independent mobility and social skills development</td>
</tr>
<tr>
<td></td>
<td>2010-2013</td>
<td>Laaksoharju et al. (2012), Hussein (2012), Said (2012)</td>
<td>Studies demonstrated benefits of direct and indirect experience in nature: playing in forest and orchard, gardening and being in sensory garden on children’s social skills</td>
</tr>
<tr>
<td></td>
<td>2010-2013</td>
<td>McCurdy et al. (2010), Corraliza et al. (2012), Roe &amp; Aspinall (2011)</td>
<td>Studies investigated direct and indirect experience in nature on restorative affect, stress, negative emotions and behaviour, as well as, its relationship with environmental behaviour</td>
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3.2.1. Cognitive development

Cognitive development includes intellectual, thinking, problem solving skills, attention and concentration (Duerden & Witt, 2010; Kellert, 2002). Previous studies have demonstrated that direct and indirect experience with nature increase and improve children’s cognitive level which includes concentration, attention abilities, performances and thinking skills.

Children experience the nature through exploration and play in a direct way. Playing in the natural environments that offer various affordances stimulate their sense and further improve and develop their cognitive skill. Attention abilities of children in pre-school improve after staying and playing in green outdoor environments with a greater amount of vegetation, shrub and terrain compared to other settings with less amount of green (Mårtensson et al., 2009). Children cognitive beliefs also increase through direct experience in nature in a summer camp which further influence their environmental attitude and behaviour (Collado et al., 2013).

A study in a pre move and post move by Well (2000) on indirect experience found that middle childhood children whose move living close to nature increased in cognitive level than before, living surrounded with less amount of nature (Wells, 2000). Studies also demonstrated that even views towards nature positively affect children’s cognitive level. Girls living in an apartment with a view towards nature through window reportedly having greater concentration abilities (Taylor et al., 2001). Another study with undergraduate students has also shown the same result. Students in dormitory with natural view through window have greater attention abilities than those with no natural view (Tennessen & Cimprich, 1995).

Indirect experiences in nature can positively affect children’s performance. Views toward greater amount of trees and shrubs from the cafeteria and classroom are associated with high academic scores, graduation rates, and reduction of their involvement in immoral activities (Matsuoka, 2010). Critical thinking skills of students who participated in environment-based programme also increase compared to students in traditional environmental science classes (Ernst & Monroe, 2006).

Studies on the nature and children with Attention Deficit Hyperactive Disorder (ADHD) and Attention Deficit Disorder (ADD) also present similar outcomes. Symptoms of children with ADD reduce after they have participated in activities in green areas (Taylor et al., 2001). Children with ADHD have a greater concentration, complete tasks and follow instructions after playing in green areas compared to playing indoors with games and playing basketball in court (Kuo & Taylor, 2004). Recent study by Taylor & Kuo

<table>
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<tr>
<th>Year Range</th>
<th>Authors</th>
<th>Study Focus</th>
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<tbody>
<tr>
<td>1995-1999</td>
<td>Zelezy (1999)</td>
<td>Study examined effects of direct and indirect experience with nature on environmental behaviour</td>
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<tr>
<td>2010-2013</td>
<td>Cheng &amp; Monroe (2010), Collado et al. (2013)</td>
<td>Study focused on benefits of direct experience in nature in developing affinity and connection to nature, interest in nature activity based and environmental behaviour</td>
</tr>
<tr>
<td></td>
<td>Veselinovska et al. (2010), Duerden &amp; Witt (2010)</td>
<td>Study demonstrated benefits of direct and indirect experience in nature in developing empathy to nature and environmental awareness attitude</td>
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(2009) found that children with ADD have better concentration after a walk in the natural environment than a walk in the downtown or neighbourhood.

3.2.2. Physical development

Physical development in children develops from direct experience in nature through play and exploration. Children are found to be physically active when playing outdoors compared to playing indoors. Physical development of children mostly has been studied using the theory of affordances by Gibson (1979). Affordances theory explains that children value places or environments that allow them to engage with activities and play (Gibson, 1979).

Various affordances in natural elements give them opportunities to explore through physical activity and further develop their motor fitness (Fjortoft & Sageie, 2000; Fjortoft, 2001). Children’s versatile play through exploration improves their motor fitness in balance and coordination abilities (Fjortoft, 2001). Natural environment such as forest woodland area offer children with a variety of affordances to explore and play through physical activities and further develop motor abilities (Fjortoft & Sageie, 2000; Fjortoft, 2001, 2004; Said, 2012).

In a comparison study on children’s physical fitness of five to seven years old children, between children playing in the forest (natural area) and children playing in conventional playground, it demonstrates that motor fitness in children playing in the forest increase significantly compared to children playing in conventional playground (Fjortoft, 2004). Recent study also found that being physically active outdoor with greenery can inhibit child obesity (Bell, Wilson, & Liu, 2008).

3.2.3. Social development

Playing develops children’s social skills by enhancing their language and communication skills through interaction with their peers. Natural environments offer diverse, imaginative and creative play that stimulate and develop social interaction, independent social skills and environmental socialization between children (Bixler et al., 2002; Prezza et al., 2001).

Imaginative play enriches children’s social interaction and builds friendship. Children perceive a variety of natural elements in forest and orchard as their social activities places (Said, 2012). Children communicate with peers and develop friendship when playing in the natural environment (Laaksoharju, Rappe, & Kaivola, 2012; Said, 2012). They learn social skills such as manner to behave and interact with peers, confidence and work ethics (Laaksoharju et al., 2012). Engagement with natural elements in a sensory garden also helps children to develop social skills by explaining the experience with the plants and herbs (Hussein, 2012).

Increase in the number of trees on school grounds provide opportunity for children to socialize and interact with their friends. Greater amount of vegetation increases the outdoor recess time, provide a welcoming environment and encourage children to play outside (Arbogast et al., 2009). In neighbourhood context, nearby nature such as green park encourages children’s independent mobility and freedom of movement to play outdoor. Independent mobility increases their chances to develop social skills and strengthens peer interactions (Prezza et al., 2001).

3.2.4. Emotional development

Emotional development is categorized by expressions and mental states. Nowadays, children are facing various mental health issues, and stress is one of them. Children with stress will have issues in cognitive aspects in concentration and giving attention. Since nature functions as a restorative environment, studies on nature benefits on childhood mental issues have become an increasing issue of concern for the past few years (McCurdy, Winterbottom, Mehta, & Roberts, 2010; Wells & Evans, 2003).
Nature functions as a buffer for children’s stress. Children who live close to nature have lower stress level (Wells & Evans, 2003). Another study on a comparison between children in four primary schools ranging from very natural school to non natural school shows that children in very natural school has lower stress level. They are able to manage stress compared to children, who are in non-natural school (Corraliza et al., 2012).

Research on comparison between forest school and conventional school also found the positive effects of nature on children. The restoration effect in nature can positively reflect on children’s goals and the amount of restoration can vary depending on behaviour state. Children with poor behaviour benefit the most from activities in natural settings. The study suggests that experience in nature reduces anger and develops positive mood, as well as, improves behaviour (Roe & Aspinall, 2011).

Studies with people from various range of age on their childhood experiences identified that gardens function as a restorative environment and escape from anxieties and stress in everyday life. The garden creates opportunities for physical engagement with natural elements and creates excitement (Gross & Lane, 2007).

3.2.5. Spiritual development

Spiritual development has been described as one’s belief, value and meaning on something. In relation with nature, it comprises appreciation of the nature of life, feeling oneness with the environment and part of the nature. Most research on the nature and children’s spiritual development relates to children’s belief, interest, care and love to the nature. The relationship of human and nature can be explained by biophilia hypothesis. Biophilia has been described as affinity for nature, love to nature, an attraction to nature and feeling of connection to nature (Kellert & Wilson, 1993; Wilson, 1984).

In recent years, researchers in environment and behaviour, environmental psychology and environmental education have shown interest in the study on children’s connection to nature, and argued it to have an important role to mitigate environmental crises (Cheng & Monroe, 2010; Larson et al., 2009). Experience in nature develops children’s connection to nature and positively influences their interest in participating in nature based activities and environmental behaviour (Cheng & Monroe, 2010). The relationship relates with the innate feeling with the nature as an environmentalist Aldo Leopold states that one will protect the land if only one has connection to it. Playing outdoors in natural surroundings and engaging with them develop children’s empathy with the natural world and increases their environmental awareness (Veselinovska, Petrovska, & Zivanovic, 2010).

Direct experiences in nature encourage connection and increase children’s affinity towards nature. Children, who participated in a nature camp with and without environmental education showed an increase in their affinity towards nature, ecological beliefs and environmental behaviour (Collado et al., 2013). Experience in nature increases their score on eco-affinity, eco-awareness and environmental knowledge (Larson, Green, & Castleberry, 2009). Moreover, time spent in nature is found to be an indicator on environmental attitudes. Experience in the nature in a longer time has been found to be an indicator on positive environmental attitude resulted from the connection and feeling empathy to it (Stern, Powell, & Ardoin, 2008).

Indirect experience in nature is also associated positively to children’s affinity and environmental attitude and behaviour. Children involved in an environmental club show positive attitudes toward the natural environment compared to children who do not join the club (McAllister, Lewis, & Murphy, 2012). A study by Zelezny (1999) found that indirect experience through environmental education in a classroom is more effective in developing positive environmental behaviour than direct experience with nature in nature camp or field trips. Another study on indirect and direct experience impact on knowledge and behaviour shows that indirect experience with nature increase environmental knowledge more than environmental attitude whereas direct experience resulted in the same levels of environmental knowledge.
and behaviour. Combining both direct and indirect experience with nature is an effective way in developing affinity towards nature and pro environmental attitude (Duerden & Witt, 2010).

Connection to nature during childhood has a significant impact on attitude and behaviour towards nature in later life. In retrospective studies, frequent experiences in nature during childhood influence adult environmental career choices and environmental concern (Chawla, 2007; Wells & Lekies, 2006). Direct experience in wild nature associates positively with environmental attitude and behaviour while indirect nature activities such as gardening is slightly associated with environmental behaviour (Wells & Lekies, 2006). Adult, who have shown interest in visiting green areas is those, who had experience with nature during childhood (Thompson et al., 2007). Study on childhood experience in adolescent also associated with positive environmental attitude. Adolescents having direct experience in wild nature during childhood had positive perceptions on the natural environment and outdoor recreation activities (Bixler et al., 2002).

In addition, experience in nature with various affordances plays an important role in developing sense of place in children. Sense of place develops in children through direct contact with the natural elements while playing (Orr, 1992). Sense of place expands sense of self, which in turn affect positively on environmental attitude and behaviour (Kahn & Kellert, 2002).

4. Discussion

The results of this review indicate that benefits of nature in every developmental need have links with each other. Creating natural space and environment with various affordances fosters children to play outdoor and allows them to experience the nature. Play and experience in the nature then contributes to children’s cognitive, physical and social development, restores positive emotion, develops sense of place, empathy and care for nature, as well as, associates positively with environmental attitude and behaviour. Direct experiences in nature benefit the most on children’s developmental needs and combination of both experiences: direct and indirect are the most beneficial.

This finding shows strong evidence on the importance of nature in children’s environment. The quality of environment that offers engagement with nature will not only affect their development as children now but also in later life as an adult. However, studies on the benefits of nature on children have been done on children rather than with children. Studies were conducted based on adult’s perceptions on benefits of the existing natural environment designed by adult. The existing environment may not fulfil the children’s real needs. Children’s preferences and perceptions of the environment are often misunderstood by adults who design their spaces. Therefore, there is a need to understand children’s view towards nature and environment in creating spaces and environment that benefit them. According to the United Nations (UN) Convention on the Rights of the Child 1989, children should have been given an equal right as an adult to enjoy a healthy environment that supports their holistic development. Children also have rights to voice in environmental management decision.

5. Conclusion

In summary, it is crucial to reconnect children with nature in their daily environment since nature experiences benefits children’s holistic development. The danger of Nature Deficit Disorder is likely to require interventions through various fields including built environment to reconnect children with the nature. In order to reconnect children with the nature and environment, children’s view and voice should be given consideration to ensure children’s environment is design based on their needs. Children are the future guardian of the earth. Thus, studies on children’s environment from children’s perspective are vital because the environment shapes children’s attitude and behaviour as children now and in adulthood later.
References


