



Benefits of Nature on Children's Developmental Needs: A Review

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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 face 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 experience in nature and the effect of disconnection from 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.

Keywords: Children, nature, connection, developmental needs

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1.0 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 experience in the outdoor environment is rapidly declining (Clements, 2004; Gaster, 1991; Karsten, 2005), which 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).

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 an adverse effect on children's developmental needs. Thus, it is important to understand the benefits of nature and environment on children's 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 the 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.

2.0 Literature Review

2.1 Children's experience in nature

Children experience the nature in two types of contact, which are direct and indirect experience. Direct experience in nature involves actual contact with natural settings through exploration, play and activities in green areas and wildlife without human control (Freeman & Tranter, 2011; Kellert, 2002). Indirect experience in nature occurs 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. Indirect experience in nature also occurs through visual and verbal interface explaining the nature with the absence of actual contact. It includes experience from electronic media, such as television and computer, as well as in written communication from books and magazines or learning in a classroom (Kellert, 2002).

2.2 Children's disconnection with nature

The scenario of children's disconnection with nature and outdoor environment gives negative effect on children's development and well-being. Children are facing various health issues such as obesity (Ä & Yilmaz, 2008), Attention Deficit Disorder (ADD), Attention Deficit

Hyperactive Disorder (ADHD) and vitamin D deficiency as the consequences of disconnection with nature.

Children will see themselves separated from the natural world when they have less real contact with living things and obtain most of experience through electronic media (Cohen & Horm-Wingerd, 1993). They expressed negative feelings towards nature or 'biophobia' (Wilson, 1984). Children will also have misconception about the natural environment, lack of knowledge on the natural environment and convey more expressions of fear and dislike than appreciating, caring or enjoyment towards the natural environment, especially with wild nature (A Simmons, 2006; Tunstall, Tapsell, & House, 2004).

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 experience in nature during childhood. Adults who have experience 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).

A generation that appreciates nature, green areas and landscape will cease to exist if the trend of 'Nature Deficit Disorder' among today's children continues. 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.

2.3 Benefits of nature on children's developmental needs

Researchers from a different range of disciplines including education, psychology and landscape design have described the importance of nature on children. Literatures in environment and behaviour, environmental health, environmental education and environmental psychology have demonstrated that connection, experience and engagement to nature have a positive effect on children's cognitive, physical, social, emotional and spiritual development. Biophilia hypothesis explains that human have an innate affinity for nature and need nature for aesthetics, intellectual, cognitive and spiritual meaning (Kellert & Wilson, 1993).

This review highlights the benefits of nature on children that involve 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 have also 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

Benefits of nature on developmental needs	Years	Authors	Description
Cognitive	1995-1999	Tennesen & Cimprich (1995)	Study examined indirect experience in nature to children's attention abilities
	2000-2009	Wells (2000), Martensson et al. (2009), Matsuoka (2010), Ernst & Moore (2006), Taylor et al. (2002)	Studies examined the benefits of direct and indirect experience in nature on concentration, attention abilities and performance
		Taylor et al. (2001), Kuo & Taylor (2004), Taylor & Kuo (2009)	Studies focused on the benefits to nature on children with ADD and ADHD disabilities
	2010-2013	Collado & Corraliza (2013)	Study investigated direct experience in nature (nature camp) benefits on children's cognitive belief.
Physical	2000-2013	Fjortoft & Sageie (2000), Fjortoft (2001, 2004), Said (2012)	Studies investigated direct experience in nature benefits on motor fitness and motor development
Social	2000-2009	Prezza et al. (2001), Bixler et al. (2002), Arbogast et al. (2009)	Studies demonstrated direct experience in nature benefits on independent mobility and social skills development
	2010-2013	Laaksoharju et al. (2012), Hussein (2012), Said (2012)	Studies demonstrated the benefits of direct and indirect experience in nature: playing in forest and orchard, gardening and being in sensory garden on children's social skills
Emotional	2000-2009	Wells & Evans (2003), Gross & Lane (2007)	Studies investigated the benefits of direct and indirect experience in nature on anxiety and stress
	2010-2013	McCurdy et al. (2010), Corraliza et al. (2012), Roe & Aspinall (2011)	Studies investigated direct and indirect experience in nature on restorative affect, stress, negative emotions and behaviour, as well as its relationship with environmental behaviour
Spiritual	1995-1999	Zelezny (1999)	Study examined the effect of direct and indirect experience with nature on environmental behaviour
	2000-2009	Lohr & Pearson-mims (2005), Wells & Lekies (2006), Chawla (2007), Thompson et al. (2007), Larson et al. (2009), Bixler et al. (2002)	Studies investigated the benefits of direct and indirect experience in nature during childhood on attitude and behaviour towards nature

	2010-2013	Cheng & Monroe (2010), Collado et al. (2013)	Study focused on the benefits of direct experience in nature in developing affinity and connection to nature, interest in nature-activity based and environmental behaviour
		Veselinovska et al. (2010), Duerden & Witt (2010)	Study demonstrated the benefits of direct and indirect experience in nature in developing empathy to nature and environmental awareness attitude

a) Cognitive development

Previous studies have demonstrated that direct and indirect experience with nature increased and improved children's cognitive level including concentration, attention abilities, performances and thinking skills. Attention abilities of children in pre-school are improved after staying and playing in green outdoor environment with a greater amount of vegetation, shrub and terrain compared to other settings with less amount of green (Mårtensson et al., 2009). Children's cognitive belief is also increased through direct experience in nature in a summer camp, which further influenced their environmental attitude and behaviour (Collado et al., 2013).

A study in pre-move and post-move by Well (2000) on indirect experience found that middle childhood children who live 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 have been reportedly having greater concentration abilities (Taylor et al., 2002). Another study found that students in dormitory with natural view through window have greater attention abilities than those with no natural view (Tennesen & Cimprich, 1995).

Views towards greater amount of trees and shrubs from 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 increased compared to students in traditional environmental science classes (Ernst & Monroe, 2006).

Studies on nature and children with Attention Deficit Hyperactive Disorder (ADHD) and Attention Deficit Disorder (ADD) also present a similar outcome. Symptoms of children with ADD were reduced after they participated in activities in green areas (Taylor et al., 2001). Children with ADHD have greater concentration, tasks and follow instructions after playing in green areas compared to playing indoors with games and playing basketball in court (Kuo & Taylor, 2004). A recent study by Taylor & Kuo (2009) found that children with ADD have

better concentration after a walk in the natural environment than a walk in downtown or neighbourhood.

b) Physical development

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 and woodland areas 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 between children playing in the forest (natural area) and children playing in conventional playground, it is demonstrated that motor fitness in children playing in the forest increased significantly compared to children playing in conventional playground (Fjortoft, 2004).

c) Social development

Natural environment offers diverse, imaginative and creative play that stimulates and develop social interaction, independent social skills and environmental socialization between children (Bixler et al., 2002; Prezza et al., 2001). Children perceive a variety of natural elements in forest and orchard as their social activities places (Said, 2012). They communicate with peers, develop friendship and learn social skills when playing in the natural environment (Laaksoharju, Rappe, & Kaivola, 2012; Said, 2012; Laaksoharju et al., 2012). Engagement with natural elements in a sensory garden also helps children to develop social skills by explaining the experience with plants and herbs (Hussein, 2012).

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

d) Emotional development

Nature functions as a restorative environment and a buffer for children's stress. Children who live close to nature and study in very natural school have lower stress level (Wells & Evans, 2003; Corraliza et al., 2012). Research on the comparison between forest school and conventional school has also found a positive effect 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 experience identified that gardens function as a restorative environment and escape from anxieties and stress in

everyday life. Garden creates opportunities for physical engagement with natural elements and creates excitement (Gross & Lane, 2007).

e) Spiritual development

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). A study also found that 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).

Children who participated in a nature camp with and without environmental education showed an increase in their affinity towards nature, ecological belief 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, experience in nature for a longer time has been found to be an indicator on positive environmental attitude resulted from the connection and feeling empathy to the environment (Stern, Powell, & Ardoin, 2008).

Indirect experience in nature is also associated positively to children's affinity, environmental attitude and behaviour. Children involved in an environmental club showed positive attitudes towards the natural environment compared to children who do not join the club (McAllister, Lewis, & Murphy, 2012). However, 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 trip. Another study suggests that 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 experience in nature during childhood influence adult environmental career choices and environmental concern (Chawla, 2007; Wells & Lekies, 2006). Adults who have shown interest in visiting green areas are those who had experience with nature during childhood (Thompson et al., 2007). Adolescents having direct experience in wild nature during childhood also 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 a sense of place in children. The sense of place is developed in children through direct contact with natural elements while playing (Orr, 1992). The sense of place expands the sense of self, which in turn affects positively on environmental attitude and behaviour (Kahn & Kellert, 2002).

3.0 Methodology

Journals related to children and nature were first identified from online databases; Science Direct, SAGE, JSTOR and Taylor. The journals consist of different disciplines: children's environment, environmental psychology, health and place, environment and behaviour,

environmental education and landscape architecture. Articles related to the benefits of nature on children's developmental needs were then selected using a combination of keywords: children, nature, natural environment, connection, experience, restorative, development, cognitive, physical, social and emotional. With the guided literature search as explained, 35 articles published between 1990s-2013 were selected for review. This review categorized the benefits of nature to children's specific developmental needs; cognitive, physical, social, emotional and spiritual development. The types of experience in nature and the effect of disconnection with the nature were first explained before the review focused on the benefits of nature on children's developmental needs.

4.0 Results and Discussions

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 contribute to children's cognitive, physical and social development, restore positive emotion, develop sense of place, empathy and care for nature, as well as associate positively with environmental attitude and behaviour. Direct experience in nature benefits the most on children's developmental needs, with a 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, most studies on the benefits of nature on children have been done on children rather than with children. The studies were conducted based on adult's perceptions on benefits of the existing natural environment designed by adult. The existing environment may not fulfil 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.

5.0 Conclusion

In summary, it is crucial to reconnect children with nature in their daily environment since nature experience benefits children's holistic development. The danger of Nature Deficit Disorder is likely to require intervention through various fields including built environment to reconnect children with 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 designed 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 now and in adulthood later.

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