

# NATURE DEFICIT DISORDER: CAUSES AND CONSEQUENCES

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## **Introduction**

As a child, my life was ruled by a dog. This was because he was not an ordinary domestic canine but rather a semi-wild African hunting dog called a Basenji, and because it was my responsibility to walk him for no fewer than 3 hours per day. Any less exercise, and he would howl all night and tear up the carpet. We spent countless hours hiking through the verdant oak woodland of the Napa hills, hiding under dense live oaks in a downpour, and ambling through the wildflowers on sunny spring days. Because of this daily responsibility, many of the basic developmental changes I experienced as a child occurred in a state of nature. Although my experience is not typical of anyone I know, it was the norm for the vast majority of human history, wherein people spent their entire lives hunting, gathering and living in the wild. However, in recent decades the basic environment in which children experience major developmental changes has suddenly shifted from a natural to an urban one; from outdoor to indoor (Louv, 2005). Instead of playing in fields and chasing lizards, kids are increasingly passing their childhoods indoors, stimulated by technology. A recent study shows that children now spend an average of 7 hours and 38 minutes a day, or about 53 hours a week using media, such as cell phones, video games, TV, and computers (Kaiser, 2010). A growing body of research indicates that this nature disconnect is related to lower school achievement, lack of self-confidence, and many other social, emotional, intellectual and physical problems (Charles, 2009) which author and honorary co-chair of The National Forum on Children and Nature Richard Louv has dubbed "Nature Deficit Disorder". This is an enormously important condition which we, as educators and parents, need to understand more fully in order to help guide our children toward healthy growth. In this essay, I will examine why

this shift away from nature has happened, how a child's cognitive development is affected by exposure or lack of exposure to natural environments and discuss the implications of these findings for parents and teachers.

## **Discussion of Research**

### *Historical Background*

Human history is typically calculated from the time homo habilis evolved into homo sapien about 1.6 million years ago. If one visualizes this 1.6-million-year period of human development as a single 24-hour day, people stopped hunting and gathering and began raising their food in semi-permanent residences only about nine minutes ago. For 23 hours, 51 minutes of our "day" of human evolution, our basic neurological processes have developed in a hunting-gathering context within nature. Furthermore, it has just been since the Industrial Revolution about 300 years ago that people began spending most of their days inside working, equivalent to only 16.2 seconds of the 24-hour "day" of human history. During the overwhelming preponderance of human history, our neural capacities and response patterns have been conditioned in response to spending our childhoods in nature, but suddenly we find ourselves developing indoors, cut off from the natural context with which we are so deeply familiar.

This movement indoors has been influenced by a number of factors. Urbanization, itself a result of industrialization, has certainly been a major force, with approximately 75% of the U.S. population living in urban areas now, up from 35% in 1890 and only 5% in 1790 (USA Online, 2001-2011). Between 1982 and 1997, the amount of land devoted to urban uses rose 34% in this country (Alig, Kline & Lichtenstein, 2003), and open

spaces have been filled or fenced off as the US population has doubled since 1950 (US Census, 2010). This has led to what Richard Louv (2005) calls "The Criminalization of Natural Play" (p.27), as children are forbidden to wander by multiplying park rules, environmental and building regulations, and parental fear of litigation. Importantly, beginning in 2008 for the first time in history a majority of people on Earth live in cities (UNPFA, 2005). Not only is there less nature to experience; families are moving away from what remains.

Social changes have further exacerbated the shift from outdoor to indoor culture. Fewer children walk or ride their bicycles to school (I counted only 3 bikes at the bike rack in front of my daughter's elementary school today). They are driven to school, and then shuttled to sports practice/events, school-related functions, and finally home. These structured after-school activities are increasingly taking up time traditionally spent in free play with friends. Even if a child has access to a field, hillside, or other natural play space, she has no time in her busy social schedule to enjoy it. When finally done with all the educational and extra-curricular commitments common to a modern child's life, they curl up in front of the computer to check emails or surf the web, or turn on the television, hooking their brains into the "electronic umbilica of today's contemporary lifestyles" (Charles, 2009, para 3). Building clubhouses in the field has been replaced by Little League; climbing trees supplanted by You-Tube; playing cowboys and Indians superseded by Nintendo.

### *Kinds of Natural Experience and the "Big Shift"*

Stephen R. Kellert, Professor Emeritus of Social Ecology at Yale, divides natural experience into three types: direct, indirect and vicarious (Kellert & Kahn, 2002, p. 120).

*Direct experience* involves physical contact with natural settings and non-human species independent of human intervention and control (wilderness, open fields, wild turkeys).

*Indirect experience* is much the same except that it occurs in a more controlled, restricted environment (aquarium, farm, pets). *Vicarious experience* occurs in the absence of

physical contact with natural settings (National Geographic magazine, cave art, TV).

With this conceptual framework, it is clear that what is occurring is an ongoing historical shift from a direct (hunter-gatherer) to indirect (farmer) to vicarious (media) experience of nature. This is the "Big Shift" which lies at the heart of a child's developmental challenges in these changing times. Vicarious experience of nature is insufficient to a child's growth, and direct exposure to natural environments is essential to a healthy child's maturation in a variety of ways. Now I will examine specifically how a child's cognitive development is impacted by direct exposure or lack of exposure to natural environments.

### *Developmental Effects of Exposure or Lack of Exposure to Nature on Children*

The consequences of a disconnect with nature during the formative years are many and serious. "Play in nature, particularly during the critical period of middle childhood, appears to be an especially important time for developing the capacities for creativity, problem-solving, and emotional and intellectual development." (Kellert, 2005, p.83) Let us break cognition into two areas - *intellectual and emotional* - in order to more specifically assess how nature exposure relates to development.

*Intellectual development*, as described by Jean Piaget, involves acquisition and comprehension of knowledge by assimilation or accommodation. In the Cognitive-

Developmental theory of child development, a child is strongly motivated to make sense of his personal world, which must be reasonably complex to maximize intellectual growth. "Environmental variables, including visual and auditory experiences, are thought to greatly influence the number and density of neuronal responses" (Turner & Greenough, 1985 as cited in Zaradic, 2008). Therefore, the richness and complexity of, for example, a forest environment would be an ideal context in which to develop the capacity for identifying, sorting, and retaining information and ideas. "The child confronts in nature an especially salient, diverse, and invigorating stream of objects and subjects useful in developing and practicing the capacities for labeling, differentiating and classifying that are so basic to the knowledge stage of cognitive maturation." (Kellert & Kahn, 2002, p. 123) It is interesting that most early-childhood educational materials (even in urban schools) relating to sorting and classifying involve animals, plants, foods, and other natural features of nature. These objects are historically what children have always classified first, and those neural pathways remain open and responsive to this traditional input. The Pulitzer Prize winning biologist, Edward O. Wilson has suggested that the natural world is the most information-rich environment people will ever encounter. As a child grows, the natural environment never diminishes in potential for cognitive stimulation; while a 4-year old may be fascinated by a snowflake gently floating down to earth, an adult can spend hours contemplating the life cycle of nature as a metaphor for reincarnation. It is no wonder that numerous recent studies have identified environmentally-integrated learning as beneficial in the following areas:

- "higher scores on standardized measures of academic achievement in reading, writing, math, science, and social studies;

- reduced discipline and classroom management problems;
- increased student engagement and enthusiasm for learning;
- greater pride and ownership in students' accomplishments" (SEER, 2005)

Conversely, a child growing up in an urban setting has a much less expansive realm of input from which to draw for his or her intellectual growth stimulation. Technology presents an endless supply of data points and video games are unquestionably stimulating, but they do not contribute to healthy cognitive development as nature does. A longitudinal study by the American Academy of Pediatrics concluded that "Viewing television and playing video games are associated with increased subsequent attention problems in childhood." (Swing, et. al. 2010) Not only does this amazing array of technological stimulation not help a child's development, it seems to actually impair it. Some have hypothesized that this is due to over-stimulation, and an unevenness and rapidity of pace which is at odds with the natural passage of time in life (Zaradic, 2008). This is a unique characteristic of nature: only in nature are children able to process such an enormous stream of ever-changing, yet constant stimulation with such a comfortable, even relaxing effect.

Nature is also a rich context in which to develop *emotional complexity*. Wonder, joy, fear, anxiety, and satisfaction can all be experienced on a simple hike. "The child's sense of wonder, displayed as surprise and joy, is aroused as a response to the mystery of the stimulus of nature that promises 'more to come' or, better still, 'more to do' - the power of perceptual participation in the known and unknown." (Cobb, 1977 as cited in Louv, 2005, p.127) In early childhood, this sense of wonder and exploration perfectly reflects the child's emerging consciousness as he makes sense of the vivid new world. However, the

emotional benefits of nature continue into later years as well. "Contact with the natural world, especially during middle childhood, occupies a surprisingly important place in a child's emotional responsiveness and receptivity." (Kellert, 2002, p. 126) It is during this period that "biophilia" - an innate tendency to affiliate with natural things - deepens and becomes a permanent emotional characteristic. In the absence of natural exposure, this biophilia never takes root, leading to a generation of citizens whose concern for preserving nature is less precisely when the Earth needs it to be more. The great natural history writer Robert Michael Pyle captures this emerging emotional connection with nature perfectly in describing his childhood haunt, an irrigation ditch near his home:

"It was my imaginary wilderness, escape hatch, and birthplace as a naturalist... It is through close and intimate contact with a particular patch of ground that we learn to respond to the earth, to see that it really matters... These are places of initiation, where the borders between ourselves and other creatures break down, where the earth gets under our nails and a sense of place gets under our skin." (Pyle, 1993)

Without regular childhood exposure, *biophilia* - the love for and empathy with nature - is replaced by *biophobia*, which can range from discomfort to active scorn of natural places, and a preference for the indoors, man-made and air conditioned. As a wonderfully honest 4th-grader commented to Richard Louv in an interview, "I like to play indoors 'cuz that's where all the electrical outlets are." (Louv, 2003. p. 10) For kids raised away from nature, it is seen as dangerous, off-limits, and worst of all - boring. In the environmentally-pivotal decades to come, these children will grow into policy-



influencing adults who lack the love of and commitment to the natural world necessary to ensure its survival.

### **Implications of Research**

Nature-Deficit Disorder manifests throughout life in many important ways. Here follows a summary of what current research indicates as some of the most salient symptoms of the condition:

- Increased incidence and intensity of ADD, ADHD, and other behavioral and emotional disorders
- Increased incidence and intensity of depression
- Increased "Biophobia" - fear and avoidance of nature
- Increased "Videophilia" - "the new human tendency to focus on sedentary activities involving electronic media." (Zaradic, 2008)
- Increased disciplinary and behavioral problems in school and home
- Decreased ability to cope with stress
- Decreased self-esteem
- Decreased interest in and care for the environment in coming generations, leading to deforestation and worsening natural conditions
- Lower standardized test scores in school in Reading, Writing, Math, Social Studies, and Science
- Decreased interest in unstructured nature-based play time leading to low creativity and powers of imagination

It is interesting that a key element of affective development is the need for play to be unstructured. A recent report from the American Academy of Pediatrics found that, "free and unstructured play is healthy and - in fact - essential for helping children reach important social, emotional, and cognitive developmental milestones as well as helping them manage stress and become resilient." (Ginsberg, 2010) In an era in which children are more enrolled in extra-curricular sports than ever before, kids have less unstructured playtime and less space for such play. In short, the manicured grass of the soccer field is no substitute in terms of developmental stimulation for a random patch of wilderness.

### **Conclusion**

Outdoor play in natural settings integrates informal play with formal learning and stimulates all the senses at the same time. Children explore, observe, and then create games based on these perceptions, utilizing the medium of the natural environment. Multisensory play experiences in nature build "the cognitive constructs necessary for sustained intellectual development" (Moore, 1997 as cited in Louv 2005). Technology, with all its complex powers, does not approach nature in terms of multisensory engagement, and both television and video games present children with stimulation instead of supplying a context in which the kids create the stimulation.

With this in mind, it is essential for parents and teachers to facilitate and encourage exposure of children to natural environments which engage intellect and imagination. Unstructured, free play must be allowed, and this may require a lifestyle shift away from after-school activities such as sports, cheerleading, girl scouts, etc., to create time for the nature-based activities which are essential to a child's health and development.

Exposure to technology, including television, video games, and internet, should be limited so that it takes up less time than free, natural play. Currently the ratio of weekly free outdoor play to TV, DVD, and game consoles use is roughly 1:70 in favor of the latter. (University of Michigan, 2010) Clearly, this damages a child's development, and must be remedied before we can hope to see attention-related disorders decrease.

Although this point seems self-evident, schools must allow recess. A 1989 study showed that 96% of schools allowed recess; 10 years later, that number had dropped to only 70%. (Ginsberg, 2010) In addition, schools should resist cultivation of play spaces, and maintain areas of school grounds to resemble natural environments with a plethora of free-play materials, such as berries, rocks, and trees.

Schools need to integrate outdoor and nature-based experiences throughout the school curricula. Teachers should be encouraged to bring the outdoors indoors with plants, animals, insects and with ecologically-based learning labs. Semi-regular field trips to natural environments should also be part of every school (and parent's) schedule.

Parents, whenever possible, should walk their children to and from school, or if the child is of sufficient age, let him walk or bike with a friend. According to a University of Michigan study less than 13 percent of U.S. children walked or biked to school in 2004, compared to more than 50 percent who did so in 1969. (University of Michigan, 2008) The study found that walking or biking to school leads to a much healthier population.

A growing body of research into child development shows consistently and clearly that; 1) exposure to nature, especially with a focus on free play, is cognitively beneficial to a child's growth and resulting mental health as an adult and that; 2) the current trend toward indoor, technology-based entertainment results in problems in the areas of

attention, behavior, school achievement, self-discipline, loneliness, and depression (Zaradic, 2008). Taken together, this is a resounding wake up call for all of us as parents, teachers, and members of society to actively engage in the counter-culture movement of returning the child to nature. Nature Deficit Disorder is a curable condition, but it takes conscious adult authority figures to administer the remedy.

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