Education & Counteraction of the Negative Implications of Nature Deficit Disorder in Children:

An Effective Means for Increasing Society's Valuation of Nature and Conservation

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Most people are acutely aware that we are living in a time of environmental crises. At an increasing rate, pollutants are being released into the atmosphere, soil, and water, natural areas destroying wildlife, and exploiting fisheries, fertile land, and water. Other resources are becoming more scarce, an increase in vector-borne diseases, and meteorological events are becoming more severe. This is all occurring under the context of an increasingly warm planet and exponentially growing levels of human population and consumption (Cullinan, 2011). Attempts have been and are continuing to be made to increase concern for our environment to protect the well being and prevent the demise of both human and nonhuman beings on our planet. Although some attempts have been successful, such as the Montreal protocol, which led to significant decreases in the rate of atmospheric ozone depletion, the general trend is that people are too apathetic to tackle and combat the current state of environmental crises.

With this in mind, the question arises: why we are continuing to destroy the world around us when we know that it is harming us, and what can we do about it? There are several reasons why such attempts at environmental salvation have likely been unsuccessful. Firstly, messages that are aimed at changing such behavior often involve behaviors from which the actor would not be directly benefited or harmed if he or she failed to pursue them (Davis, 1995). Secondly, people are more susceptible to discounting the well being of the future in decision-making when they are distanced from nature (Van der Wal et al., 2013). Thirdly, people are currently becoming more isolated from their surroundings, and it is unlikely that people will have concern for the environment unless they spend time outdoors (Logan & Selhub, 2012). My belief is that increasing information about nature deficit disorder can both directly and indirectly tackle problems associated with initiating pro-environmental decision making, and will also lead to an overall increase in the reverence that society has for the Earth.

To begin with, a description of what nature deficit disorder (NDD) is, what has caused it, and what its implications are for our children must be provided. Nature deficit disorder is a general term for the negative effects that children experience from not spending enough time in nature, which are influencing all areas of life including mental, emotional, cognitive, social, and physical well-being (Louv, 2005). This term was coined by Richard Louv, a non-fiction author, which was described in his book *Last Child in the Woods-Saving our Children from Nature Deficit Disorder.* Nature deficit disorder is becoming a more serious phenomenon as children, especially those in the Western world, are spending less and less time outdoors (Louv, 2005). For example, one study in the U.S. interviewed mothers and discovered that only 26% of their children played outside every day, while 70% of these mothers recalled having played outdoors every day when they were growing up (Charles & Louv, 2009).

Firstly, the mental health of children is suffering as they are spending more time indoors, where they no longer receive the mental health benefits of playing outside. Such mental health associated with playing outdoors include decreased irritability and anger, heightened attention, and improved mood and relaxation (Logan & Selhub, 2012). In fact, it has been demonstrated that more relaxed brain waves, slower heart rates and lower blood pressures can be derived from simply viewing scenes

that have vegetation in them (Logan & Selhub, 2012). Thus, not surprisingly, it has demonstrated symptoms of mental illnesses such as depression, anxiety, behavioral conduct disorders, and attention deficit hyperactive disorder can be alleviated when children play outside (Wolf & Flora, 2010; Louv, 2005). Because children are not receiving these psychological benefits from playing outdoors, there has been a sharp increase in the number of children that are being diagnosed with and medicated for mental illnesses such as depression and A.D.H.D. For example, a report published in 2003 announced the period of time five years prior, there was a 60 percent increase in the number of children prescribed antidepressants-the largest increase was among preschool children (Louv, 2005). Such increases in rates of depression can in part be attributed to the decrease in the amount of time that children are spending playing outside. Additionally, up to 30% of children in certain schools are now being prescribed Ritalin (Louv, 2005). However, it is highly unlikely that many of these children are being misdiagnosed with A.D.H.D because they are eliciting signs associate with the disorder. For example, when children are not allowed to play outside and "get out their energy," they are more likely to fidget and will have a decreased ability to pay attention in class (Louv, 2005). Thus, many of these children may be "cured" by simply spending more time playing outside (Louv, 2005).

In terms of educational and cognitive benefits, it has been demonstrated that children who learned in an outdoor settings showed benefits in language arts, math, social studies, and science, not only in terms of test scores but also in problem solving skills, motivation to learn, and self-esteem (Louv, 2007). Additionally, spending time outdoors has been shown to have a positive influence on children' imaginations and creativity, such as by being more likely to make up their own games and rules when playing in more natural areas rather than on flat playgrounds (Louv, 2007). Unfortunately, with the increase of nature deficit disorder and the infrastructure that allows for it, children are failing to receive these educational and cognitive benefits associated with spending time outdoors.

Interestingly, children who play outside tend to have more friends than those who spend the majority of their time inside, and it has also been demonstrated that racial minorities and females are more likely to be included when children are playing in natural areas (Louv, 2005). Children suffering from nature deficit disorder will unlikely experience such benefits.

In addition to the cognitive, psychological, and social benefits children are receiving from not spending enough time indoors, they are also suffering in terms of their physical health. For example, between the years 1988-1989, obesity rates in children increased by 36 percent among children between the ages of two and five, largely due to decreases in the frequency in which children are playing outside (Louv, 2005). Indeed, children who play outdoors are much more likely to be physically active and tend to have better immunity than those who tend not to (Baranowski et al., 1993; Grahn et al., 1997). In fact, the sheer proximity to green spaces is positively correlated with increased levels of health and physical activity (Stigsdotter et al, 2010). Specifically, improvements in physical activity in children have demonstrated improved agility, fine motor coordination, balance, and physical health benefits associated with low levels of stress (Grahn et al., 1997). One such reason for improvement is that brain

connections that improve coordination and balance are stimulated when people are presented with the more challenging environments that exist outdoors, which tend to have uneven and complex surfaces that include things like slopes, tall brush, and boulders (Fjortoft, 2004). These physical health benefits are examples of what children who do not play outside will largely fail to receive.

The question that then follows is what are the societal and contextual factors that are contributing to the continual expansion of nature deficit disorder in children? The largest factors that are contributing to this phenomenon involve the combination of a rise in the use of technology in children, increased safety concern among parents for their children playing outdoors unsupervised, increased neighborhood rules that limit the way in which and areas in which children can play, a lack of sufficient time to play outside, a decreasing provision of environmental and outdoor education in schools, and decreasing availability of green space (Louv, 2005).

In terms of technology, we currently find ourselves in a day and age in which the use of various technologies including laptop computers, cell phones, iPods, iPads, and television are becoming more frequently used each year (Louv, 2005). In fact, in America, children between the ages of eight and eighteen have been found to spend around 75 hours each week on electronic media, which includes an average of playing video or Internet games for almost three hours and watching T.V. for five hours each day ("Daily Media Use," 2010). Thus, children are choosing to spend more time on these "gadgets," which can often be very addicting, rather than playing outside. For example, one fifth grader, when questioned about why he preferred playing inside better, replied matter-of-factly, "'cause that's where all the electrical outlets are'" (Louv, 2005).

Additionally, we are entering a day and age where there is an increasing fear for so called "stranger danger," as the media repeatedly publishes sensationalist stories of horrific events, such as child abductions and rapes (Louv, 2005). As exposure to media stories increases with the expansion of social media, people become more exposed to these sensationalist stories. These news reports are causing parents to believe that child abductions and other criminal acts towards children occur frequently and are becoming a more prevalent issue, when in reality, the number of child abductions by strangers has remained steadily at around one hundred per year in the U.S. for the past two decades (Louv, 2007). Additionally, the total number of violent acts directed towards young people has actually decreased to levels lower than those even in 1975 (Louv, 2007). Thus, parents may be much more anxious than they need to be about their children playing outside, and could enhance the safety for their children of playing outside by giving them a cell phone to carry in case of an emergency and having them play with other friends (Louv, 2005). There is even the argument that if parents are too protective over their children, the children will not be able to develop a sense of independent judgment, street smarts, and self-esteem, which may put them at an even higher risk for getting into dangerous situations (Louv, 2005).

One reason why there have been cuts to environmental and outdoor education has to do with the legislation of the No Child Left Behind Act ("No Child Left Inside," n.d.). This act has led to increasing funding for math and read-

ing-subjects in which teachers are now feeling pressured to have their students succeed, at the cost of learning about other subjects ("No Child Left Inside," n.d.). For example, many teachers are drawing attention and resources away from teaching social studies and science, and are therefore decreasing the amount of time they spend on outdoor education and field trips where these subjects are often taught. This is due to increasing pressures for their students to perform well on standardized tests for math and science ("No Child Left Inside," n.d.). In addition, many teachers are no longer teaching science material that will not be tested for on standardized tests for science subjects ("No Child Left Inside," n.d.).

Finally, although not the primary factor in the decrease in the amount of play that children are getting indoors, there has been a decrease in the amount of available green space over time population and consumption decreases, leading to deforestation and development where natural areas once existed.

Along with increases in the use technological devices and a decrease in the perceived safety for children of playing outside, there have also been a growing number of rules placed on children that are restricting the areas and ways in which they can play (Louv, 2005). Some examples of such restrictions, which are either placed by the cities or neighborhood associations, include: bans on tree house building out of fear that they may pose a fire hazard, or making it illegal to construct a tree house unless a building permit is obtained, banning building forts in certain areas, prohibiting chalk drawing or adding basketball hoops to neighborhoods in order to preserve a certain manicured look in the area, and rules that limit where people are allowed to walk in natural areas (Louv, 2005). Thus, often times communities are contributing towards the isolation from the outdoors that children are currently experiencing, rather than striving to combat it.

Now that nature deficit disorder has been defined and contextualized, the belief that increasing awareness about this disorder is key for increasing pro-environmental thought and behavior will not be discussed.

One prevalent reason that messages about the harm humanity is causing to the Earth and the call to action are not being heard likely have to do with the fact that the actions people are being asked to take in order to preserve the environment are often abstract, in that the benefits of the changes they are asked to make cannot be directly perceived or received by the person taking the action (Davis, 1995). For example, if one sells one's car and starts using public transportation to get to where he/she need to go, he/she will not be able to perceive the decrease in greenhouses gases and pollution that are emitted each day because of the action taken. In addition, the individual will be unable to perceive the direct benefit to him/herself associated with this decrease in emissions. For example, one will is in fact not likely to be-personally less as risk for respiratory disease from air pollution because he/she individually has stopped driving a car. In fact, one study that investigated how messages should best be framed in order to communicate important information regarding environmental protection found that, "intentions to participate in environmentally-responsible behaviors are best fostered through communications which present simple, clear, and understandable actions prevented in a context which stresses how the target will be personally, negatively affected if they continue to be inactive participants in environmental-

ly-responsible behaviors" (Davis, 1995). Thus, according to this theory, a pro-environmental message like, "stop driving your car to work" may be ineffective because the person cannot comprehend or measure how they, specifically, will benefit from their own actions. In addition to being ineffective at changing behavior, it seems unlikely that these types of messages would increase the extent to which people care for the environment.

Increasing education and awareness about nature deficit disorder is one example of the type of message that would successfully promote an environmental behavior in which if the person does not engage in the behavior the messages is trying to promote, he/she will be "personally negatively affected" by failing to do so (Davis et al, 1995). For example, if the parent notices that their daughter is socially isolated, obese, unhappy, or doing poorly in school is because she are not spending enough time outdoors, the parent will likely feel a direct obligation to resolve this problem by making sure their child plays outside more, as they will benefit directly by having healthier, happier children. In this situation, parents and possibly their children, will be able to monitor directly the benefits that their actions in having their children play outside more will bring about (which was not possible in the air pollution example presented above). Thus, parents will likely take information about what nature deficit disorder is and how it can be combated seriously due to the fact that if they do not, they will continue to be directly, negatively, affect by failing to do so. Because information regarding nature deficit disorder and how it can be reversed will be likely be taken seriously, parents and communities will likely begin to have an increased reverence for the environment overall, as they realize the importance that it holds for well-being of their children, and maybe even begin to experience some of these benefits themselves as they spend more time outdoors with their children.

Next, in order for people to have concern for nature and conservation, and to be able to think about the long-term consequences of their actions, it has been demonstrated that people must be exposed directly to nature, which is mediated in part by increases in empathy (Logan & Selhub, 2012; Schultz, 2000). For example, one study suggested that increased exposure to nature likely increases *nature relatedness* (the realization and appreciation for the fact that all things in the world are interrelated), which was found to be positively correlated with pro-environmental attitudes and behaviors, such as in regards to pet ownership or vegetarianism (Nisbet & Zelenski, 2009).

Therefore, a paradox exists in which our children, the world's future decision makers, are becoming more and more isolated from nature, while they will be in a position in the future where they will be required to a larger extent than ever before to make pro-environmental decisions in order to protect their well-being. What can be deduced is that in order for our children and future generations to have the empathy for nature that will motivate them to protect it, it is necessary that they become re-acquainted with it. This process can be explained by social psychological theory. When one spends time in nature, they will begin to feel that they are a part of the environmental community, and will therefore incorporate nature into their concept of their "self" (Mayer & Frantz, 2004). Thus, if nature begins to feel like a part of them, destroying nature would be equivalent to destroying oneself (Mayer & Frantz, 2004). The understanding that oneself

is intricately connected to the larger whole can be an effective means to increase compassion for the environment around us has been shared by many such as Aldo Leopold, who expressed in his book *A Sand County Almanac,* "we abuse land because we see it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect" (Leopold 1949). The concept he discusses- discovering that individuals are embedded in the world rather than separate from it could effectively be enhanced if we were to spend more time with our natural surroundings.

Then the question arises- how can we motivate individuals to spend more time outside? Increasing the amount of time that people spend outside and thus the extent to which they care for the environment could be facilitated by increasing awareness about the effects that nature deficit disorder is having on children. As parents learn about the terrible effects that nature isolation is having on their children, they may be more likely to make sure that their children spend time outdoors, and to push for society to provide the infrastructure and resources necessary to allow for it. If children are able and encouraged to play outside more, they will receive more exposure to nature and will therefore have increased levels of appreciation and concern for Mother Earth, assuming the idea that exposure to nature is necessary in order to have concern for it (Logan & Selhub, 2012). In doing so, we can ensure that children are developing a love and appreciation of the natural environment from a young age. This will ensure that this love and appreciation for nature is not something that we try and coerce people to feel when they become adults, but rather something that develops naturally from childhood. Additionally, parents today may also experience increases in empathy for nature as they play outside more frequently with their children. Thus, parents can help to alleviate and prevents symptoms that their children are experiencing of nature deficit disorder while at the same time helping to create a future generation of individuals who are willing and ready to combat the environmental crises as they become more compassionate about the Earth through spending time with it.

Finally, the discount effect is one of the reasons that sparking changes in thought and actions pertaining to the environment is so difficult. The discount effect refers to the fact that we will value receiving a reward immediately more than we value receiving that reward, or an even larger one, in the future (Vander Wal et al., 2013). This is one of the most prevailing problems contributing towards the environmental crises, as people are valuing short-term over long-term well being. For example, the overexploitation of marine fisheries is largely attributed to the fact that nations believe it is more important to provide people with an unlimited amount of fish in the here and now than to ensure that there is enough leftover for future generations which could be achieved through sustainable fishing practices (McGinn, 1998).

The fundamental reason that discounting is so rooted into human thought and behavior stems from an evolutionary instinct-which is no longer relevant for many people in the world, but still exists within us. Our ancestral cave people lived in a time when food was difficult to acquire and conditions were often dangerous, which meant that valuing short term over long term rewards often meant the difference between life and death (Van der Wal et al., 2013). Unfortunately, this tendency to discount

the future has carried through to current generations and has dangerous implications for the world we currently live in.

It has been demonstrated in several studies that individuals who are exposed to nature may be highly susceptible to discounting the future (Van der Wal et al., 2013). This may be because when one is in a more natural environment, he or she may be more aware that he or she is embedded in the natural world, and may therefore be more likely to make decisions that are better for the environment as a whole (Leopold, 1949). For example, those who are told to walk through an urban area or to view pictures of urban areas are more likely to demonstrate the discount effect than those who are told to walk through a natural areas or view pictures that had vegetation. The extent to which they discounted the future was determined by discovering that those exposed to natural settings were more likely to choose receiving smaller monetary rewards immediately over receiving larger receiving larger monetary rewards 90 days from the study day (Van der Wal et al., 2013).

With such studies in mind, it becomes evident that increasing awareness about nature deficit disorder will indirectly decrease the extent to which these children may be vulnerable to the discount effect when they become adults responsible for making decisions that can either protect or hurt the environment. If children begin to spend more time outdoors from a young age after parents become more educated about the dangers of nature deficit disorder, these children will likely be less susceptible to the discount effect when they become adults. This would be due to a combination of having early exposure to natural settings at a young age, and the fact that those who are exposed to and appreciate nature at a young age are more likely to have concern for it when they grow up (Van der Wal, 2013; Logan & Selhub, 2012; Mayer & Frantz, 2004).

In conclusion, if combatting nature deficit disorder is to be used as means in order to increase the care current and future generations have for the environment and therefore the extent to which they will protect it, specific, viable, and effective solutions must be investigated for getting children to play outside again. There needs to be an increase in education about this issue, which could be brought about by having health care professionals and physicians distribute flyers and put up posters that have information about this phenomenon (Louv, 2007). In addition, factors that have caused nature deficit disorder to become so prevalent in the first place must each individually be targeted.

In terms of technology, parents could help to engage their children in fun and exciting activities outdoors that provide them with fun alternative to using electronic media (Louv, 2005), such as planning scavenger hunts for their children outside, or engaging in outdoor art projects together that involve using flowers, leaves, etc. This, in addition, could be paired with restricting use of electronic devices, which could be paired with information provided directly to the child on the benefits of playing outside rather than spending their time on "gadgets" (Louv, 2005). Parents may feel bad if they are restricting the amount of time that children use electronics for everyday. However, the benefits of doing so largely outweigh the costs of doing so. Additionally, as a child spends more time outside, he or she will likely begin to appreciate the fact their electronic use was restricted.

The idea that "your kids will thank you

later" expressed above has been directly drawn from my own childhood experience. When I was a child, I used to watch hours and hours of television each day. One day, while my siblings and I were watching television after preschool, my mother walked into the room, jabbed the power button, and announced that she had had it with our sedentary indoor lifestyle and that from that point onward, television watching was forever banned from our household. As I wailed and convulsed on the rug in hysterics, my little fists punching the sofa, I felt certain that my world had come to an end. But what I would not realize for some time was that this household television ban would be the best gift that my parents could ever have given me, as my days became filled with rich and fulfilling memories such as: watching with amazement as a butterfly emerged from a cocoon, unfolded its wrinkled wings, and took its first flight, turning over logs to look for wiggling earthworms, learning that I could plant sprigs of certain plants and they would grow in the ground, and climbing the sugar maple tree in my front yard, descending only when the branches narrowed and wavered ominously under my feet. When reflecting on my childhood, I can say with confidence that spending my time sitting inside passively watching the screen could never have replaced these moments of exploration, imagination, learning, joy, fascination with the intricacies of life, and the empathy and compassion for nature that grew inside through this connection to nature, which I consider to have been vital for every stage of my development.

In terms of increasing available green space, there could be an expanded effort by community members push their cities and governments to not only protect more of the existing green space, but also to re-green certain areas (Louv, 2007). Such re-greening could be conducted through converting abandoned plots of land into green spaces, arranging new housing developments such that they surround a central green area, and increasing the number of community gardens or green roofs in cities (Louv, 2007).

In terms of safety, it is necessary that parents become aware that the likelihood that their children will be harmed while playing outside unsupervised is very low, especially if they are with friends and have a cell phone. Parents should also be encouraged to allow their to play in a more free manner, such as allowing them to climb trees, go outside when it is raining, play in the mud, and run around on uneven terrain (Louv, 2005). In order to lift the safety concerns that parents have for children, they must be educated about the benefits that their children would receive from this type of free play, and become aware that they may be causing their children more harm than good by placing so many rules on them to protect them from dangers they believe to be more frequent and serious than they likely are in reality (catching a cold, scraping one's knee, etc.)

Additionally, there should be increasing education to cities and neighborhood associations about the negative effects children are experiencing due to these rules and regulations about where children can play. This could be bolstered by an increased involvement of parents and community members to fight such stringent regulations in their communities.

Finally, decreasing the occurrence of nature deficit disorder and therefore increasing the extent to which children and future generations care for the environment could be provided by increasing the amount of outdoor and environmental education and exposure that children re-

ceive in school. In opposition to the No Child Left Behind act, a coalition formed who have cleverly named their group, "No Child Left Inside." This group is aware of the negative impacts that children are experiencing from not spending enough time in nature, and are therefore working towards encouraging congress to pass a legislation that would require the scope of the No Child Left Behind Act to be expanded to include environmental education ("No Child Left Inside," n.d.). Thus, more initiatives such as these that directly target the education system could help to decrease symptoms of nature deficit disorder by sending kids back outside, which will in turn increase the extent to which they care for the environment (Logan & Selhub, 2012; "No Child Left Inside," n.d.).

In taking these measures to reverse nature deficit disorder, there will hopefully be an increase in the overall respect and love that people have for the Earth, which will be revealed in their decision-making and actions.

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