The Importance of Time Spent Outdoors During the Preschool Years

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Abstract

This paper seeks to explore how time spent outdoors in nature influences school readiness for preschool children. The purpose for compiling this literature is to bring together multiple sources from a variety of disciplines to gain a fuller picture on any influence outdoor time has on school readiness. The review of research found that outdoor time is linked to higher levels of activity, better physical fitness, higher levels of on-task behavior, enhanced executive functioning, increased socialization, and improved emotional health. These variables, in turn, directly effect school performance. Thus, outdoor time is indirectly linked to school performance. It is noted that additional longitudinal research and specific focused research on outdoor time and its direct correlation to achievement at the preschool level would be informative. The implications of this review show that increased outdoor time, particularly at childcare centers, is effective in helping children prepare to enter school.

Keywords

Outdoor time, Children, Preschool, Nature Deficit Disorder, School Readiness, Urban Planning, Childcare

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This paper seeks to explore how time spent outdoors in nature influences school readiness for preschool children. Looking at trends of time spent outdoors over a period of a century or more would be interesting but there is little data recorded. We know humanity has been closely tied to nature and has gotten much benefit from the use of our natural world (Soga & Gaston, 2016). Bassett et al. (2015) suggest we can look at societies in our world that have not adopted modern conveniences to see how children behaved historically. They discuss several groups whose children indicate a benefit in the outdoor time of these lifestyles. The ongoing trend toward urbanization seems to have a part to play in how and how often a child of today spends time outdoors. Since, as urbanization continues to increase, more children are growing up in urban settings with less access to outdoor play space (Oswald et al., 2020).

One of the concerns related to outdoor play time is the amount of time children spend watching or gaming on electronics. With the increase in availability of electronics, children are less concerned about finding engaging and entertaining play areas outdoors (Staempfli, 2009). Over the last 30 years media consumption has increased in children and in 2009 even preschoolers consumed over 32 hours of TV content a week (Bassett et al., 2015). Hinkley et al. (2018) found more screen time and less time spent playing outdoors contributed to a decreased level of social skills. According to Oswald et al. (2020), the increase of screen time and parallel decrease in time spent outdoors together are leading to a "statistically significant association" (p. 11) with psychological results.

The period of childhood we call preschool refers the time between birth and the age of five and is filled with many developmental experiences. Preschoolers learn to walk, talk, and relate with the world around themselves. Some children spend this time with their families and

others spend part of their day in a childcare setting. Epp and Velagaleti (2014) explain how an increase in dual-income families, urbanization, and the distance between family members creates more market for childcare services. Given this increase in the use of childcare, it is important that society considers the outcome of childcare activities and the physical premises in which these activities take place.

Knowing the value of the preschool formative years and of outdoor time, this paper seeks to explore the relationship of these elements in parallel and ascertain if outdoor time influences a preschooler's development.

Literature Review

This review of literature will begin with a look into previous generation's outdoor time in nature and factors influencing that time. The next aspect reviewed will be the current experience of outdoor time during the preschool years. Finally, the impact of outdoor time and any influence this time has on developmental markers of school readiness will be explored.

Factors Influencing Outdoor Time in Previous Generations (3)

In the late 1800s and early 1900s there was a significant push to create parks in which people could experience the joys of contact with nature (Chawla, 2015). The many resulting green spaces have remained through the course of multiple generations. Chawla (2015) states that children and adults benefited from the setting aside of outdoor space in well-known parks such as Central Park in NYC. Richard Louv (2005), in his bestselling book *Last Child in the Woods,* speaks about himself and children of his time spending hours playing in some piece of nature near their home. Louv indicates this sort of play in nature was normal for children of the time.

Urban parks were of significant interest in the late 19th and early 20th centuries. Crompton (2013) talks of many varied factors, including sanitation and relief of the cost of poverty, being the impetus behind this interest. This interest occurred concurrent to a huge increase in urbanization in western society as the Industrial revolution pulled many people to factory jobs. He goes on to explain that a report by Sir Edwin Chadwick titled *Report on the Sanitary Conditions of the Labouring Population of Great Britain* released in 1842 provided much of the data and logic for Americans trying to develop their own planning and development process. The question of the validity of this data for use in America apparently was not a concern as it appears Americans accepted the data as useful. Crompton (2013) tells us that a study published in 1845 by the New York City's health inspector John H. Groscom entitled *The Sanitary Condition of the Labouring Population of New York City with Suggestions for its Improvement* followed and built off Chadwick's earlier report and espoused many of the same ideas. In this report, Groscom suggested the creation of public parks as a way of keeping epidemics at bay and it seems like the general population took his word because numerous parks were authorized with reference these principles. Chawla (2015) tells us that years later "mosaics of mundane nature filled marginal and interstitial spaces…kitchen gardens, pastures for milk cows and work horses, overgrown vacant lots" (p. 433) in cities of the United States in the time leading up to WWII. We do not know exactly how children used these parks and what the results of this use were in the early parts of the 20th century since there was little interest in research about children in nature and its effects.

One of the efforts made to provide green space for all Americans was the national park system. National parks in the United States came into being in the late 19th century, according to Mackintosh et al. (2018), with the establishment of Yellowstone by an act of Congress in 1872.

They tell us that by 1916 there were fourteen national parks and twenty-one national monuments under the governance of the Department of Interior and the National Park Service was created to oversee these locations. This level of national involvement in the preservation of outdoor spaces seems to have continued the trend started in urban centers in the mid-1800s. Mackintosh et al. (2018) discuss the establishment of the Civilian Conservation Corps in 1933 enhanced park's usefulness to the public and by 1942 the system of parks saw six million visitors. They indicate number of visitors in the post-WWII era soared as families took advantage of automobiles and available time and fuel to travel with thirty-three million visitors in 1950 and 72 million visitors in 1960. These national parks tended to be removed from urban areas but nonetheless provided opportunities for anyone with the ability to travel a place to experience the outdoors.

Throughout the 20th century farm life was a part of many children's experience. Labao & Meyer (2001) indicate that at the beginning of the century a peak of more than one-third of American households lived on a farm. This would indicate that at least one out of every three families had plenty of outdoor space for their children to roam and work in. Labao & Meyer (2001) discuss how the era after WWII brought about some of the most rapid change in the number of families living on farms. They show that between 1940 and 1970 the farm population dropped from 23 to 5 percent of the United States population. A drop of this magnitude and the subsequent moving to urban areas created a meaningful change in the experiences of children in the United States. Louv (2005) suggests that those born during this period might be the last generation to experience a "familial attachment" (p. 19) to nature.

By the 1970's the aspect of a child's involvement in natural areas became a subject of study and according to Chawla (2015) this interest in scholarly understanding led to "a five-day symposium fair on Children, Nature, and the Urban Environment" (p. 435).in Washington, DC.

The Northeastern Forest Experiment Station's (1977) report of this symposium shares in the forward of a concern that urban children of that time where becoming estranged from the natural world. The forward goes on to mention that this symposium was desigend to be multi-displinary so that this estrangment could be addressed from a variety of different viewpoints. Chawla (2015) credits three individuals at this symposium as leaders who were at the forefront of this movement to learn about a child's interaction with nature. These individuals; Roger Hart, Robin Moore, and Kevin Lynch were undertaking research in a variety of settings to help the world understand how children changed their actions and feelings based on their environment. She goes on to describe how these men found that children were happy to make use of cast off natural spaces and that the children's use of these spaces had positive effects on their knowledge of themselves and their world as well as enhancing their creativity. The outcomes of this research shared at this symposium and the surrounding push to understand the interactions of children and nature lead level of understanding which most current research is based on.

Children's Current Experience of Outdoor Time

Louv (2005) notes that within one hundred years American's time in nature "has gone from direct utilitarianism to romantic attachment, to electronic detachment" (p.16). The decrease in outdoor time over the last forty years has been explored by many researchers and they have described the changes as significant (Dickinson, 2013; Kemple et al., 2016; Soga & Gaston, 2016). Most of these papers seem to have a narrow view on the subject of outdoor time as a whole and must be combined in order to get a realistic sense of the effects of reduced outdoor time. It is worth noting that visits to national parks, that were described earlier in this paper as growing rapidly, peaked in 1987 and have been generally declining ever since (Pergams & Zaradic, 2008). This decline is not sufficient evidence to prove an overall reduction in outdoor

time, as noted in a rebuttal letter by Jacobs & Manfredo (2008) but does indicate a change in how people are experiencing the outdoors. One of the largest factors related to the time children spend outdoors is how much time children of today spend using electronic devices (Bassett et al., 2015; Hinkley et al., 2018; Kemple et al., 2016; Larson et al., 2011; Louv, 2005; Oswald et al., 2020; Soga & Gaston, 2016). Certianly the increased use of electronics appears to effect the quantity of time children spend outdoors. As we look at the big picture, two overarching reasons that children are less involved in outdoor activity seems to be a lack of oppourtunity and the loss of attachment to natural areas (Louv, 2005; Soga & Gaston, 2016).

There is significant data that indicates children's time in nature is decreasing. Soga & Gaston (2016) show that on a variety of metrics the data indicates a decline in participation in the first decade of the 21st century. Larson et al. (2011) list a number of studies that indicate a decline in children's time spent outdoors. They share their concern that many of these studies are narrow in scope and tend to be constrained by factors such as "recall bias and nostaligia" (p. 2). One of the concerns that is shared is that much research into time spent outdoors is specifically focused on free-play time and does not encompass all time spent outdoors. In the search for literature for this paper the same problem arose with finding broad measures of outdoor time and any change in the quantity over the course of generations. The National Kids Survey was created by the U.S.D.A to help develop both a baseline and the ongoing deviation (Larson et al., 2011). This survey covers both the broad strokes of children spending time outside and the details of how outside time is spent. The first data from this survey collected between 2007 and 2009 revealed that most children were spending two or more hours of time per day outside. This fluctuated from weekday average of 63% to a weekend average of 78% of children spending two hours or more outdoors.

Analyzing the reasons for any decline in time spent outdoors becomes a complicated undertaking due the the large variety of factors children and adults cite when discussing this decline. The lack of access to outdoor areas is a common concern raised in urban settings. Soga & Gaston (2016) talk about how populations concentrating into urban centers removes natural space and replaces it with man-made structures and systems for many people. Kemple et al. (2016) mention fears about safety of children who are playing outside as a concerning factor for some parents.They go on to remind us that familes with parents that work often utilize child care which typically includes limited outdoor time. Larson et al. (2011) list issues such as access, indoor sports, and lack of transportation as other reasons given for children not spending more time outdoors. Bassett et al. (2015) discuss the changes in modes of travel to school and the physical education programs at schools as significant in reducing outdoor time.

The pull of electronic devices and the media consumed on such devices seems to have a significant role in children's desire to spend time outdoors. Bassett et al. (2015) tells us that preschool children in the United States during 2009 spent more that 32 hours a week using electronic entertainment. Later Hinkley et al. (2018) found that in a study in Melbourne running during 2013 and 2014 the average daily screen time was just over two hours while the average daily outdoor play time was just over three hours. Soga & Gaston (2016) discuss how electronics and the virtual alternatives they allow are likely part of children's lack of emotional attachment to the natural world. As children get more involved with electronics, that lack of involvement with nature leads to less attachemt which continues to perpetuate the cycle. This effect of growing ellectronics time has continued to grow significantly in the last fifeteen years with Oswald et al. (2020) reminding us that "moderate ST [screen time]" (p. 2) can be a positive with may children even being required to use electronic devices as part of their school programs. Thus

while electronics clearly have an impact on children's time outdoors it would be unfair to blame electronics as the main problem. Instead, electronics should be included in the evaluation along with all other factors.

The Influence of Outdoor Time on Preschooler's development

The findings in this section will be primarily focused on preschool children though some overlap will occur with experiences of all young children. The research on outdoor time and its influence on preschoolers does not seem to be fully developed but there is much we can know and build upon. This section will be broken into four domains to describe what Louv (2005) has broadly called *Nature Deficit Disorder* which he defines as "the human costs of alienation from nature" (p. 36). The specific focus for all the domains is the question of whether outdoor time or the lack thereof has influence on readiness markers in preschoolers. Dickinson (2013) encourages us to be skeptical as we approach this topic by looking at other factors that work in relation with outdoor time, or the lack thereof, to bring about physical, cognitive, social, and emotional deficits.

Outdoor Time and Physical Development

Benefits of outdoor time include enhanced motor skills, better physical fitness, decreased risk of myopia, and higher levels of vitamin D (Becker et al., 2014; Kemple et al., 2016; Soga & Gaston, 2016). Chawla (2015) tells us that motor skills and balance are enhanced by outdoor activity, particularly in unstructured environments as opposed to developed playgrounds. Chawla (2015) also talks about a study in the United States that associated decreased levels of asthma and allergies in 4–5-year-olds in areas with more trees along streets but also shares that other studies indicated inconclusive evidence for a variety of people groups. There are physical

concerns associated with outdoor time such as the risk of encountering pesticides, pollution hazards, diseases caried by insects, and skin disease (Chawla, 2015; Kemple et al., 2016). When discussing physical activity, studies will use moderate-to-vigorous physical activity (MVPA) as a measure of activity that can make a statistically significant difference. Most countries in the Western world have recommended that preschoolers get at least one hour of MVPA per day (Kemple et al., 2016; Truelove et al., 2018).

Truelove et al. (2018) tell us that childcare centers are a good environment for implementing and studying physical activity measures. They cite the quantity of the population enrolled in such centers and the ability to stage systematic change as good reasons to focus on children in centers. They go on to discuss how outdoor time as centers produces 4-10 times more MVPA than time spent indoors. Tandon et al. (2018) found that while children are two times more active outdoors than indoors only one in three children met the recommended guidelines. Bassett et al. (2015) also found that there is evidence that suggests childcare locations as good places for systematic changes that encourage more physical activity. Vanderloo et al (2015) found that children in childcare centers only had about 1.5 minutes per hour of MVPA. The results of the meta-analysis by Truelove et al. (2018) showed that children spend an average of 45 minutes a day outdoors in center-based care and that children spent approximately 12% of this outdoor time engaged in MVPA. There is some dispute over exactly how much physical fitness prepares a child for school but generally having good physical fitness is a positive measure (Lundy & Trawick-Smith, 2020).

Outdoor Time and Cognition

Spending time outdoors may enhance some cognitive activity. Attention, self-regulation, and executive function are all aspects that are measured by researchers (Becker et al., 2014;

Becker et al., 2018; Lundy & Trawick-Smith, 2020; Kemple et al., 2016). These aspects of a child's function and behavior are hard to measure independently as they are all interrelated, thus several of them are usually discussed under one study.

Numerous studies mention that effect that outdoor time has on the ability to be on-task. Lundy & Trawick-Smith (2020) tell us about two theories of why physical activity relates with better cognition and development. The first is "chronic aerobic exercise theory" (p. 463) which states that the cardio and respiratory fitness bring about this relationship. The second reason is "acute excercise theory" (p. 464) which holds that motor activites are directly linked to cognitive functioning. There would seem to be reason that both of these theories hold some value, though there is much more coresponding data that supports the chronic aerobic exercise theory (Lundy & Trawick-Smith, 2020). Becker et al. (2020) indicate that physical fitness in children influences behavioral control and greater brain activation. They mention that activities that combine both phyiscal activity and higher cognitive demands are more strongly correlated with stronge exective function. Lundy & Trawick-Smith (2020) found that for some children a short physical activity does increase on-task behavior. More specifically they found that after hour-long outdoor activity periods, on-task behavior in an indoor learning activity could be enhanced. This was especially true for students who were at more risk for off-task behavior, notably in low SES populations and males. They note that the level of activity in the outdoor time is significant as higher levels of activity (MVPA) correlate best with subsequent on-task actions.

Self-regulation is an important part of school readiness as it encompasses a number of the skills needed to sit in a classroom and receive instruction from a teacher. Becker et al. (2014) found that increased outdoor MVPA correlated well with self-regulation measures in preschoolers in their study. Interestingly MVPA did not directly correlate with increased math or

literacy scores. The correlation they found was between higher self-regulation scores and math and literacy outcomes. Becker et al. (2014) go on to discuss how "inhibitory control, working memory, and attention" (p. 65) are required elements of the task they used to test self-regulation. These are some of the same skills needed to effectively engage in academics. They also discuss how children's bodily action is becoming linked to how a child learns. This linkage seems to occur in the part of the brain called the cerebellum which generally is considered to control our coordination of motor function but now is being seen to control coordination of academic skills.

Executive function is performed in the pre-frontal cortex of the brain and includes numerous processes required for goal-directed behavior (Chang et al., 2013; Becker et al., 2018). Chang et al. (2013) use that definition to explore the relationshop of exectutive function and physical activity. In their study they used a flanker test to quantify executive function in addition to EEG scans. They found that having a child engage in a soccer activity over a period of time raised scores on the flanker test and showed increase speed on the EEG. These researchers had split their experimental group into low intensity and medium intensity activity divisions. They found that the level of intensity did not enhance the scores overall. One limit of this study is the lack of a control group that many have clarified the low and moderate intesity differentials (Chang et al., 2013).

Outdoor Time and Socialization

Kuo (2013) tells us that green space is linked to several social benefits. He lists enhanced feelings of community, decreased aggressiveness, and better impulse control. Social behavior can be an indicator of both literacy and math scores and can also be influenced by outdoor activities (Becker et al., 2018). Hinkley et al., 2018 remind us that, unlike the use of electronic media, outdoor activities tend to include interacting with other children in the activity. They go

on to present their findings on the correlation of outdoor play and three social skills: compliance, expressiveness, and distruption. These researchers found that compliance and expressiveness were both positively correlated with any time spent outdoors, while disruption was negatively inpacted by the outdoor time. In addition, children that met the recommendation of three hours of outdoor play per day showed slightly stronger results across all measures.

Outdoor Time and Emotions

Outdoor time has been used by people all over the world to shed emotional baggage and refresh the mind and spirit (Chawla, 2015; Kuo, 2013; Oswald et al., 2020). The psychological linkage between the outdoors and emotional health continues to be the object of study but we are beginning to have data that fills us in on the details. Chawla (2015) tells us that both anecdotal and professional evidence indicate “nature is a protective factor” (p. 444) to emotional wellbeing. She tells us about four studies that indicated proximity to green areas had an effect on psychological health. In the first study Dutch children showed a significant correlation between more green space near their home and decreased rates of depression. While in Scotland, living closer than twenty minutes from green areas correlated with enhanced mental health. The second study indicated that, for children in England who lived in poverty, green space and emotional health where associated. The third study showed that, in Lithuania, children of mothers without much education had increased levels of mental health when they lived closer to parks and green areas. In the fourth study children of rural New York showed less stress and more self-worth when they resided nearer to nature. The effects of this New York study were even stronger in children who had more stressful lives. Kuo (2013) also found that numerous studies were available to link psychological health to nature. He includes data that shows depression and anxiety are increased by 33% and 44% respectively on medical records when people do not have

green space located within one kilometer of their home. Kuo (2013) shares that overall increased time in nature brings about significant positive benefits no matter if the nature is a bit of urban greenness or a big park. He states that "While green is good, more is generally better" (p. 179). Oswald et al. (2020) completed a systematic scoping review of research regarding both electronics use and nature time. They ended up with three studies that applied to psychological health in children under five years of age. In these studies, they found that the effect of nature time was mixed, with both no association and affirmative associations. They agreed that greenness near one's residence had a positive association with mental health but that the distance to green space did not show effect. They did find that natural space at childcare centers was associated with less depression and enhanced peer relationships in one study.

Conclusions and Implications

Based on the literature reviewed in this paper there is reason to link outdoor time and readiness for school, though it is important to understand the nuances of this relationship. Few studies make direct links between outdoor time and preschooler's readiness to enter school. Instead, the research shows indirect links by showing relationships between attributes and strengths that prepare children for success in elementary school and time spent outside. The fact that there are not direct links is not a huge concern because humans are complex beings and readiness for school is a bit of a moving target as well. It is much easier to research a specific attribute, skill, or attitude and its relationship with outdoor time and then discuss how those attributes, skills, and attitudes relate to the requirements of academics.

My initial thought about the relationship between outdoor time and school readiness was that the outdoor time would enhance readiness. Personal experience in the world of outdoor therapeutic camping taught me that after living in an outdoor camp for a year, older children make significant gains in their academic levels without a normal level of school instruction. Since the time in a natural setting is part of what helps these older children, it would follow that time in a natural setting would be likely to help children of a different age.

As with therapeutic camping, the research into the value of outdoor time leads reveals many distinct factors working together to accomplish measurable change. Kuo (2013) describes the varying influences of outdoor time as a "pyramid" (p. 174) with layers of specificity where the base layers are broad and indirect in their influence while the point is direct influence of outdoor time on measurable benefits. In this example, each layer supports the benefit and without the base understandings we could never see the whole picture in the influence of this outdoor time.

Since there is noteworthy evidence that outdoor time influences the four attributes described in this paper and since the attributes described are understood to show school readiness, society would do well to take note. As described in this paper, there has been a lot of money and time put into developing natural areas to provide people with a place to enjoy nature. The elaborate system of parks and maintained natural areas in the United States provide most people with extensive opportunities to spend time in nature. The issue is that according to some of the research in this paper the numbers of people availing themselves of these resources seems to be declining. The issue of electronics both distracting and disengaging people from the opportunities they must experience nature is a topic that needs more attention. If we want the best outcomes for each person in our society, we need to help each other make healthy choices in

what we allow to influence us an take our time. This reasoning leads me to believe we should teach the benefits of outdoor time to each other and our children.

The thought that childcare centers are good places to implement additional outdoor time as discussed by Truelove et al. (2018) is something our educational departments should consider. Children are at their formative stages in these centers and should be served by the best we can offer to help them prepare for life. This leads me to believe that daycare centers should be encouraged by policy and possibly grant monies to "green" their facilities. The path to green childcare will involve extensive training and changing of thought processes about outdoor time in early childcare professionals. State licensing agencies and policymakers are likely the highest impact groups when it comes to spreading the idea of increasing nature in childcare settings. Based on the research in this paper societies would be well served by increasing the expectations of nature time in childcare.

Following this review of literature, a brief discussion of limitations and suggestions for additional research seem useful. One limitation of literature seems to be the sparsity of research that quantifies time children spend in any setting outdoors and the corresponding influence on school readiness outcomes. Most of the research in this article limited outdoor time to a specific setting as opposed to a broad measure of outdoor time. Knowing if just being outdoors is as effective as time in natural areas could tell us more about what aspects of time in nature influence change. Another limitation is the difficulty in breaking down complex human skills into specific cause and effect relationships. This difficulty will likely never be eliminated but with additional data we could work toward that goal. There would also be significant utility in comparing the effects of outdoor nature time between cultures to see if the related effects on school readiness are similar.

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