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### Review of Benefits of Nature Experience for Young Children

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# **Review of Benefits of Nature Experience for Young Children**

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## **Purpose Statement**

Progressing urbanization is having an impact on people's lifestyles. Increasing indoor time results in the deprivation of human's proximity to nature. Richard Louv (2008) coined the term "nature deficit disorder", conceptualized the increasing phenomenon of children suffering from anxiety, ADHD, and obesity due to spending less time in nature and more time indoor. There is a growing body of literature focusing on the benefits of nature experience, nature exposure on young children's physiological and psychological well-beings, such as physical health, attention, executive function, and behavioral regulation etc. This review focuses on the research articles that investigated the influence of nature contact on preschool-aged children.

This review's overarching question is: what benefits does nature exposure have on preschool-age children?

## **Eligible Criteria**

This review focuses on the physical, physiological, and psychological well-beings of preschool-aged children. The primary criterion for deciding if a research article is eligible for review is the grade range. Only studies that focused on preschool-aged children are eligible for review. Only peer-reviewed, published research articles were selected to maintain intellectual rigor.

## **Major Findings**

### ***Physical Health***

Research suggested that the exposure to natural environment would have benefits on preschool-aged children's physical health. It is also found that children tended to be more physically active when they had more access to natural or outdoor environment. Grigsby-Toussaint and colleagues (2011) explored the association between neighborhood greenness and preschoolers' physical activity. They compared children's neighborhood greenness (represented by the normalized difference vegetation index), the frequency and duration of outdoor physical activity, and children's body mass index. As a result, parents who resided in the neighborhood with higher level of greenness reported that their children had more frequent and longer outdoor physical activities. Furthermore, the exposure of higher level of neighborhood greenness helped reduced the risk for childhood obesity because children tended to engage in more physical activities. Lovasi and colleagues (2011) had some similar correlational outcomes from a study based in New York City. In their study, they discovered that children whose residential areas had more trees tended to be more physically active. Moreover, children who had more access to parks were found to have smaller triceps and subscapular skinfolds, which indicated the health-relevant aspects of body size. Lovasi and colleagues (2008) also conducted research looking for the impact of tree coverage on children's respiratory health in New York City. The result indicated that higher tree coverage on the street was correlated with lower rate of asthma in early childhood. Outside of the U.S., a Sweden-based study conducted by Söderström and colleagues (2013) found similar results. Their results suggested that more exposure to higher-quality outdoor environment was associated with better health outcomes on body mass index, sleep, well-being, and lower cortisol level for children aged from 3 to 5.8 years old.

### ***Psychological Well-Being***

Natural environment moderates the adverse effects of stressors on children's mental health or well-being (Wells & Evans, 2003). Ulrich's Stress Reduction Theory (1991) provided the theoretical foundation of the alleviating effect of exposure to nature on individual's physiological and psychological well-being. Empirical studies have provided evidence to support the theoretical hypotheses. Balseviciene and colleagues (2014) worked with child-mother dyads and aimed to explore the associations between residential greenness, the proximity to parks, and preschool-aged children's behavioral and emotional problems. They did not only find the significant associations, but also discover the mediating effect of mother's education level. For children whose mothers had a lower education level, further the distance between city parks and home was associated with worse mental health. An interesting result indicated higher level of residential greenness was associated with worse mental health for children whose mothers had a higher education level. Not as hypothesized, Balseviciene et al. (2014) did not find a significant effect of the proximity to parks on children's emotion problems. British researchers Flouri and colleagues (2014) also found that neighborhood greenness was unrelated to emotional problems in general. However, after accounting for children's SES, neighborhood greenness did contribute to children's emotional adjustment. Children from poor households with a higher level of neighborhood greenness had fewer emotional problems than their counterparts with less exposure to neighborhood green space. Flouri et al. (2014) also suggested that having access to garden, parks, and playgrounds was related to having fewer conduct, peer, and hyperactivity problems. In a later study conducted in the U.S., Taylor Scott and colleagues found similar benefits of exposure to nature on children's social-emotional and behavioral development. They also discovered that seasonal factor could contribute to the fluctuation of the association; they found a stronger association in the spring.

### ***Cognitive Functioning***

Researchers have been interested in the positive effect of natural environment on cognitive functions. Kaplan and Kaplan (1989) coined the Attention Restoration Theory proposing that exposure to nature renews one's ability to focus and concentrate. Norwegian scholars Ulset and colleagues (2017) found a positive association between outdoor activities and preschoolers' cognitive and behavioral development. The results indicated that when children spent more time outdoors, they showed fewer inattention-hyperactivity symptoms and scored higher on digit span test, which measured executive functions (e.g., attention and short-term memory). Carrus and colleagues (2015) found a similar result in their study that explored the benefits of spending time in nature-related areas (e.g., gardens, green space) on children's cognitive functioning. Mårtensson and colleagues (2009) found similar effects, but also found that long outdoor stay did not contribute to the boost of attention as expected. The reason might be because long outdoor stay might be implying children had to stay longer at schools, which could be a stressor that restricted their attention.

### ***Impact on Teacher***

In this review, no study reported the impact of nature experience on teachers.

### ***Impact on Classroom Community***

In this review, no study reported the impact of nature experience on the classroom community.

**Table of Result**

Author & Year	Participant Age	Participant pool	Methodology	Outcomes
Balseviciene et al 2014	4 to 6 years old	Mother-child dyads	Correlational study - NDVI	<ul style="list-style-type: none"> <li>- For children whose mothers had a lower education level, there is a significant association between the residential distance from city parks and children’s mental health. Further distance is associated with worse mental health.</li> <li>- For children whose mothers had a higher education level, higher level of residential greenness is associated with worse mental health.</li> <li>- However, emotional problems were found not associated with the proximity to city parks, which is contradictory to previous research.</li> </ul>
Carrus et al 2015	18 months to 36 months old	Rome, childcare centers	correlational study	<ul style="list-style-type: none"> <li>- Contact with nature during a typical day in childcare centers might alleviate the negative impact of indoor environment on children’s Cognitive functioning, affective state, positive social interactions</li> </ul>
Flouri et al 2014	3, 5, 7 years old	Preschools in the UK	Correlational study	<ul style="list-style-type: none"> <li>- Having access to garden, parks, and playgrounds was related to having fewer conduct, peer, and hyperactivity problems.</li> <li>- Neighborhood greenness was found unrelated to emotional problems in general. However, after accounting for children’s SES, neighborhood greenness contributed to children’s emotional adjustment. Children from poor households with a higher level of neighborhood greenness had fewer emotional problems than their counterparts with less exposure to neighborhood green space.</li> </ul>
Grigsby-Toussaint et al 2011	2 to 5 years old	Day care centers in Central Illinois	Correlational study	<ul style="list-style-type: none"> <li>- Parents who resided in the neighborhood with higher level of greenness reported that their children had more outdoor physical activities. The level of greenness was measured by the Normalized Difference Vegetation Index (NDVI).</li> </ul>

				<ul style="list-style-type: none"> <li>- The exposure of higher level of neighborhood greenness helped reduced the risk for childhood obesity because children tended to engage in more physical activities.</li> </ul>
Lovasi et al 2008	4 to 5 years old	New York City	Correlational study	<ul style="list-style-type: none"> <li>- Higher tree coverage on the street was correlated with lower rate of asthma in early childhood.</li> </ul>
Lovasi et al. 2011	2 to 5 years old	New York City Head Start preschools	Correlational study	<ul style="list-style-type: none"> <li>- Children whose residential areas had more trees tended to be more physically active. Children who had more access to parks were found to have smaller triceps and subscapular skinfolds, which reflected the health-relevant aspects of body size.</li> </ul>
Mårtensson et al 2009	4.5 to 6.5 years old	Stockholm, preschools	Correlational study	<ul style="list-style-type: none"> <li>- Access to green outdoor environment is correlated with preschool children's attention.</li> <li>- No significant correlation was found between attention and the degrees of closeness between play structures and natural elements, which was assessed by sky views. Levels of sky views were dichotomized into having less than or more than 50% of free sky in children's sky views.</li> <li>- Long outdoor stay did not contribute to the boost of attention as expected. Long outdoor stay may be implying longer stay at schools, which could be a stressor that could restrict their attention.</li> </ul>
Söderström et al 2013	3 to 5.8 years old	Day care centers in Sweden	Correlational	<ul style="list-style-type: none"> <li>- More exposure to higher-quality outdoor environment is associated with better health outcomes on body mass index, sleep, well-being, and lower cortisol level.</li> <li>- General good outcome on physiological well-being</li> </ul>
Taylor et al 2018	4 to 5 years old	Publicly funded preschools in NC	Correlational	<ul style="list-style-type: none"> <li>- In general, nature exposure had benefits on children's social-emotional and behavioral development. Children had greater SEB development when they were exposed to more natural elements either at school or home.</li> <li>- Moreover, children who had less exposure to impervious surface on their way to school had greater development in independence and social skills.</li> </ul>

				<ul style="list-style-type: none"> <li>- Being exposed to inconsistent environment (e.g., a high level of nature exposure at home and a lower level of nature exposure at school) could be counter-productive for preschooler’s SEB development.</li> <li>- Seasonal factor could contribute to the fluctuation of the association between natural exposure and SEB development. They found a stronger association in the spring.</li> </ul>
Ulset et al 2017	12 to 78 months old	Day care centers and the first year of elementary schools in Norway	Correlational	<ul style="list-style-type: none"> <li>- When children spent more time outdoors, they showed fewer inattention-hyperactivity symptoms and scored higher on digit span test, which measured executive functions (e.g., attention and short-term memory)</li> </ul>

**Summary**

The current review examines the benefits of nature experience for young children. The findings suggest that nature experience has benefits on children’s physical health, psychological well-being, and cognitive functioning. Research has indicated that having more access to natural settings would reduce the risk of childhood obesity, respiratory problems, and promote the general health. Researchers also found that when children have more exposure to greenness around residential areas or schools, they tended to have fewer emotional and behavioral problems. Moreover, family SES and mother’s educational level seems to affect the association between access to greenness and developmental outcomes. The access to greenness seems to be more impactful for students from low SES backgrounds. Children spending more time outdoor or in a natural setting could also promote their cognitive functioning, such as prolonged attention, fewer hyperactivity symptoms. From a methodological perspective, all the reviewed studies used correlational design, which did not yield strong inferential conclusions. Future study should consider utilizing experimental design in order to establish causal relationship between nature experience and young children’s developmental outcomes.

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