



COMPILATION OF REPORTS RELATIVE TO MENTAL HEALTH EXCERPTS FROM CHILDREN & NATURE NETWORK RESEARCH AND STUDIES

The following are taken from four volumes of research developed by the Children & Nature Network (C&NN) and available at www.childrenandnature.org. These C&NN Annotated Bibliographies of Research and Studies were written by Cheryl Charles, Ph.D., President, Children & Nature Network and Alicia Senauer, Yale University.

From Volume One

Natural Settings Provide Psychological Benefits

“Coping with ADD: The Surprising Connection to Green Play Settings,” by Andrea Faber Taylor; Frances E. Kuo; and William C. Sullivan (2001) is one of the earliest studies to explore the potential for contact with nature to have a positive effect in reducing the impact of attention deficit disorder in children. The study was designed to test two hypotheses: 1) Attention deficit symptoms will be more manageable after activities in green settings than after activities in other settings; and 2) The greener a child’s everyday environment, the more manageable their attention deficit symptoms will be in general. The results were positive. (Original Research)

Taylor, Andrea Faber; Frances E. Kuo; and William C. Sullivan. In *Environment and Behavior*, Vol. 33, No. 1, January 2001. © 2001 Sage Publications, Inc. Available on the web site of the University of Illinois Urbana-Champaign. <http://www.lhhl.uiuc.edu/>

Nature Activities Soothe ADD Symptoms

Contact with the natural world can significantly reduce symptoms of attention deficit disorder in children as young as five. Here is another important study that supports this finding. In addition to access to reports of the primary research, the scholars provide a Power Point presentation that may be used in communities to disseminate this positive information based on sound research. (Original Research)

Kuo, Frances E.; and Andrea Faber Taylor. “A Potential Natural Treatment for Attention-Deficit/Hyperactivity Disorder: Evidence from a National Study.” In *American Journal of Public Health*, Vol 94, No. 9, September 2004. © American Public Health Association. The study and the educational Power Point are available on the web site of the University of Illinois Urbana-Champaign. <http://www.lhhl.uiuc.edu/>

Access to Nature Nurtures Self-Discipline

This study focuses on the positive benefits to inner city youth, particularly girls, from access to green spaces for play. Even a view of green settings enhances peace, self-control, and self-discipline. While the results are most notable for girls, the evidence is not limited to the positive impact on girls. (Original Research)

Taylor, Andrea Faber; Frances E. Kuo; and William C. Sullivan. "Views of Nature and Self-Discipline: Evidence from Inner City Children." In the *Journal of Environmental Psychology*, 21, 2001. © 2001 Academic Press. Available on the Web site of the University of Illinois Urbana-Champaign. <http://www.lhhl.uiuc.edu/>

Nearby Nature Reduces Stress in Children

This study, reported in 2003, by Cornell assistant professor Nancy Wells, focuses on rural children and finds that even a view of nature — green plants and vistas — helps reduce stress among highly stressed children. Further, the more plants, green views and access to natural play areas, the more positive the results. (Original Research)

Wells, N.M., and Evans, G.W. "Nearby Nature: A Buffer of Life Stress Among Rural Children." *Environment and Behavior*. Vol. 35:3, 311-330. This study is not available online without purchase; <http://www.sagepub.co.uk/journals/details/j0163.html>

Nearby Nature Boosts Children's Cognitive Functioning

A precursor to Nancy Wells' study reported above, this research, reported in 2000, shows that proximity to, views of, and daily exposure to natural settings increases children's ability to focus and therefore enhances cognitive abilities. (Original Research)

Wells, N.M. "At Home with Nature: Effects of 'Greenness' on Children's Cognitive Functioning." *Environment and Behavior*. Vol. 32, No. 6, 775-795. This study is not available online without purchase; <http://eab.sagepub.com/cgi/content/abstract/32/6/77>

Outdoor Experience for Teens Has Self-Reported Life-Changing Results

A classic 1998 study by Dr. Stephen R. Kellert of Yale University, with assistance from Victoria Derr, remains the most comprehensive research to date to examine the effects on teenage youth of participation in outdoor education, specifically wilderness-based programs. Subjects were participants in programs offered through three old and well-respected organizations: the Student Conservation Association (SCA), the National Outdoor Leadership School (NOLS), and Outward Bound. The researchers used quantitative and qualitative research techniques, and parallel use of both retrospective and longitudinal study techniques. Results indicate that the majority of respondents found this outdoor experience to be "one of the best in their life." Participants report positive effects on their personal, intellectual and, in some cases, spiritual development. Pronounced results were found in enhanced self-esteem, self-confidence, independence, autonomy and initiative. These impacts occurred among both the retrospective and longitudinal respondents in this study, which means, in part, that these results persisted through many years.

Kellert, Stephen R.; with the assistance of Victoria Derr. "A National Study of Outdoor Wilderness Experience." New Haven: Yale University, 1998.

<http://www.nols.edu/resources/research/pdfs/kellert.complete.text.pdf>

Green School Grounds Foster Achievement and Responsibility

There are numerous studies that document the benefits to students from school grounds that are ecologically diverse and include free-play areas, habitat for wildlife, walking trails, and gardens. One major study is “Grounds for Action: Promoting Physical Activity through School Ground Greening in Canada” by Anne C. Bell and Janet E. Dymont. While this study has roots in concern about obesity in children, it documents results and benefits beyond weight loss. Children who experience school grounds with diverse natural settings are more physically active, more aware of nutrition, more civil to one another, and more creative. One of the major benefits of green school grounds is increased involvement by adults and members of the nearby community, from helping with gardens to enriching the livescape of the school grounds. Concerned about policy implications, this report offers specific recommendations for actions communities can take, from local neighborhoods to cities, states, and provinces. (Original Research)

Bell, Anne C.; and Janet E. Dymont. “Grounds for Action: Promoting Physical Activity through School Ground Greening in Canada.” © 2006 Evergreen.

<http://www.evergreen.ca/en/lq/pdf/PHACreport.pdf>

From Volume Three

Contact with nature provides a variety of health benefits

In this report, C. Maller and colleagues reviewed published literature demonstrating health and well-being benefits from contact with nature, with an emphasis on park settings. Particularly in urban areas, parks play an important role in providing people with access to nature. The authors encourage a reframing of our traditional view of parks as places for leisure and sport towards one that emphasizes a full range of physical, mental, and social health benefits. Maller and colleagues provide valuable background material on the concept of health and the connection between nature and health. The authors then review evidence of the health benefits of various forms of contact with nature, including viewing nature, being in nature, contact with plants, and contact with animals. Maller and colleagues provide a number of recommendations, including the need for additional research, the repositioning of parks, and the integration of parks and nature into public health strategies and management actions.

The authors present a number of useful summary tables, which provide quick access to major findings about the health benefits of contact with nature.

Maller, C., Townsend, M., St.Leger, L., Henderson-Wilson, C., Pryor, A., Prosser, L., and Moore, M. (2008). “The health benefits of contact with nature in a park context: A review of relevant literature.” Deakin University and Parks Victoria. The original 2002 review and annotated bibliography are available online at:

http://www.parkweb.vic.gov.au/1process_content.cfm?section=99&page=16. The updated 2008 review is available for a nominal fee by contacting Mardie Townsend at mardie.townsend@deakin.edu

Play is critical to healthy child development

In this paper, Kenneth R. Ginsburg and colleagues review key health benefits that play provides to children, including the development of new competencies and decisionmaking skills, resiliency, and the ability to share with others and resolve conflicts. In addition, the authors highlight the importance of play to the development of strong parent-child relationships. While play offers many critical benefits, Ginsburg and

colleagues review evidence highlighting the reduced opportunities many children today have for child-driven play. The authors discuss several key factors that have led to this decline and maintain that solutions to enhance child-driven play must be addressed at multiple levels (from families to communities to schools) and that each child will vary in his or her needs with regard to play and the balance between play and other activities. Ginsburg and colleagues conclude this paper with specific advice for pediatricians to enhance their ability to best guide and support parents.

Ginsburg, K. R. (2007). "The importance of play in promoting healthy child development and maintaining strong parent-child bonds." *Pediatrics*, 119(1), 182-191. This paper is available online at: <http://www.aap.org/pressroom/playFINAL.pdf>

Children's play in natural settings provides a suite of benefits

In this report, Stuart Lester and Martin Maudsley provide an extensive review of the literature related to children's natural play. The authors begin by examining the human relationship with the natural world and the importance of play and direct interaction with the physical environment to children. Lester and Maudsley then review the important opportunities that natural play provides, such as the creation of special places, and the numerous documented and potential benefits of children's play in natural settings, including the development of a sense of self and independence. The authors discuss evidence demonstrating a decline in children's access and opportunities to play in natural spaces and provide a range of suggestions to support children's opportunities to play in natural settings, such as through the design of effective playgrounds, school grounds, and environmental play projects, as well as ensuring adequate access to parks and nature reserves.

Lester, S., & Maudsley, M. (2006). "Play, naturally: A review of children's natural play." Children's Play Council. This report is available online at: <http://www.playday.org.uk/PDF/play-naturally-a-review-of-childrens-natural%20play.pdf>

From Volume Four

Children's classroom behavior is better if they have recess

Recess provides one of the few opportunities for children to engage in free play and physical activity at school and to potentially be outdoors. Barros and colleagues investigated the amount of recess 8- to 9-year-old children have in the U.S. and compared the classroom behavior of children who receive and do not receive daily recess. The researchers analyzed data from a nationally representative sample of over 10,000 third-grade children in public and private schools. As part of this study, a wide range of data was collected, including interviews with children and surveys of teachers, parents, and school administrators. In analyzing the data, Barros and colleagues found that 30% of children had no recess at all or less than a 15 minute daily break. The researchers found that children with less than 15 minutes of recess a day were significantly more likely to be black or Hispanic, live in a large- or medium-sized city, live in the South, attend public school, and come from families with lower income and less parental education. In examining school behavior, Barros and colleagues found that teachers' rating of overall classroom behavior was better for children with some recess as compared to those with none/minimal break, however, the frequency and amount of recess was not significant. While data from teachers could be biased due to their feelings about recess, this study provides valuable information about the amount of recess 8- to 9-year-old children receive and relationships to classroom behavior.

Author Affiliation: The authors are with the Children's Hospital at Montefiore and Rose F. Kennedy Center in New York.

Barros, R. M., Silver, E. J., & Stein, R. E. K. (2009). School recess and group classroom behavior. *Pediatrics*, 123(2), 431-436. This study may be available in a library near you or can be purchased online through the publisher at: <http://www.jpeds.com/>

Allocating time to physical activity in school does not negatively impact academic achievement

Over the years, there has been much discussion about the benefits and drawbacks of allocating time to physical activity in schools. In this article, Trudeau and Shepherd review the literature with regard to the relationships between physical education, schoolbased physical activity, school sports, and academic performance. Based on their review of a number of quasi-experimental and cross-sectional studies, the authors conclude that physical activity can be added to the school curriculum without negatively impacting children's academic achievement. The authors highlight literature which indicates that additional time spent in physical activity may in fact result in small increases in students' grade point averages and more efficient learning in the classroom. In addition, Trudeau and Shepherd summarize studies that have found positive associations between physical activity in school and children's physical fitness, concentration, memory, behavior, and school satisfaction. The authors summarize supporting mechanistic evidence from the neurosciences and highlight the need for additional research to further clarify relationships between academic performance and school-based physical activity.

Author Affiliation: Trudeau is with the Université du Québec à Trois-Rivières in Canada. Shephard is with the University of Toronto in Canada.

Trudeau, F., & Shephard, R. J. (2008). Physical education, school physical activity, school sports and academic performance. *International Journal of Behavioral Nutrition and Physical Activity*, 5, 12. This study may be available in a library near you or can be purchased online through the publisher at: <http://www.ijbnpa.org/>

School gardens positively impact children's learning and behavior

Gardening takes place in many schools throughout the nation. Blair reviews research in the U.S. on school gardening and its relationship to children's learning and behavior. She begins her review by highlighting the range of reasons why school gardens exist, which include providing children experiences with natural ecosystems, enhancing children's understanding of food systems, helping children develop environmental attitudes and behaviors, and serving as a basis for experiential learning. Blair then reviews quantitative and qualitative studies on the impact of school gardening on children's learning and behavior. Of the 12 quantitative studies reviewed, she found that 9 of the 12 studies found significant and positive impacts of gardening with regard to test measures, which included children's science achievement and food consumption behavior. Of the 7 qualitative studies reviewed, Blair found a number of commonalities among study findings, including that students enjoyed and were highly motivated by gardening; students demonstrated improved school attitude and pride in the garden; and gardening enhanced student bonding, teamwork, and learning opportunities. In addition, she reviewed studies that evaluated principals' and teachers' opinions about school gardens. Based on her review of the literature, Blair determined that, overall, current research indicates that gardening can have a positive impact on student achievement and behavior. She also discusses the methodological limitations of current studies and provides recommendations for future research.

Author Affiliation: Blair is with Penn State University.

Blair, D. (2009). *The child in the garden: an evaluative review of the benefits of school gardening. Journal of Environmental Education, 40(2), 15-38.* This study may be available in a library near you or can be purchased online through the publisher at: <http://www.heldref.org/pubs/jee/about.html>

Natural views from high school positively impact students' academic achievement and behavior

Matsuoka examined the relationship between views of nature and high school students' academic achievement and behavior. To investigate this relationship, he inventoried the landscape features of 101 high school campuses in southeastern Michigan and assessed student access to these features via building characteristics and school policies (e.g., through window size and the ability to eat lunch outdoors). Matsuoka also gathered information about each school's student academic achievement and conduct (e.g., the percentage of merit award winners and graduation rates). In analyzing the data, he found that landscape and access characteristics were significantly associated with student academic achievement and behavior. For example, Matsuoka found that schools with larger windows and more views of natural elements had students with higher standardized test scores, higher graduation rates, and a greater percentage of students planning to attend college, as well as fewer reports of criminal behavior. He also found that schools that allowed students to eat outside or off campus had higher test scores and a greater percentage of students planning to attend college. In examining specific landscape features, Matsuoka found that trees and shrubs needed to be relatively close to the students to provide academic achievement and behavior benefits. Importantly, Matsuoka controlled for a number of socio-demographic and general school characteristics in his analyses. While this study may be limited due to its cross-sectional design and focus on school-level information, it provides valuable insight into the benefits of natural views to high school students with implications for school design and policy.

Author Affiliation: Matsuoka is with the University of Michigan.

Matsuoka, R. H. (2008). *High school landscapes and student performance.* University of Michigan, Ann Arbor. This study is available online at: <http://hdl.handle.net/2027.42/61641>

OTHER RESOURCES RELATED TO MENTAL HEALTH

Ecotherapy: the green agenda for mental health

This is a May 2007 report from a United Kingdom mental health organization confirming that participation in "green exercise" activities provides substantial benefits for health and wellbeing.

http://www.mind.org.uk/campaigns_and_issues/report_and_resources/835_ecotherapy

Fact Sheet: Children's Health and Nature

This report from the National Environmental Education Foundation highlights some of the research above, plus other information related to the impact of the environment on children's health and well-being. http://www.neefusa.org/health/children_nature.htm.

The Powerful Link Between Conserving Land and Preserving Health

An article by Howard Frumkin, MD, Dr.P.H. and Richard Louv about the important role natural landscapes play in protecting public health. This article is available online at:

<http://atfiles.org/files/pdf/FrumkinLouv.pdf>