



Executive Summary

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Parks and Other Green Environments: Essential Components of a Healthy Human Habitat

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**National Recreation
and Park Association**

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Nature advocates and nature lovers have long claimed that parks and other green environments play an important—even crucial—role in human health. In their time, leaders such as Thoreau, Muir, and Olmsted asserted that “contact with nature” was important to psychological, physical, and spiritual health. Through the decades, parks advocates, landscape architects, and popular writers have trumpeted the healing powers of nature.

Until recently, however, these claims had not undergone rigorous scientific assessment. Are these intuitions correct? Or like so many other widely held beliefs, were they doomed to evaporate as soon as they were subjected to the harsh light of scientific scrutiny?

In the past couple decades and especially the last few years, scientists all over the world have been turning their attention to this question in diverse ways. Researchers have studied the effects of nature in many different populations, and have examined many forms of nature: Chicago public housing residents living in high-rises with a tree or two and some grass outside their apartment buildings; college students exposed to slide shows of natural scenes while sitting in a classroom; children with attention deficit disorder playing in a wide range of settings; senior citizens in Tokyo with varying degrees of access to green walkable streets; and middle-class volunteers spending their Saturdays restoring prairie ecosystems, just to name a few. The scope and variety of health outcomes and health-related outcomes have been similarly impressive.

As important as, or more important than, the diversity of this research is the rigor with which the work has been conducted. In any field with enthusiasts, you will find a plethora of well-meaning but flimsy studies purporting to “prove” the benefits of [X]. The literature on the benefits of “contact with nature” is no exception. For every rigorous study on the benefits of parks, nature-based kindergartens, horticultural therapy, and so on, there has been a cornucopia of weak findings accompanied by extravagant claims.

But in the last decade or so, rigorous work on this question has become more of a rule than an exception. No longer are studies relying solely on what research participants *report* (read: believe) to be the benefits of nature. Increasingly, benefits have been measured objectively: police crime reports; blood pressure; performance on standardized neurocognitive tests; physiological measures of immune system functioning.

Rather than relying on small, self-selected samples of nature lovers such as park-goers, scientists are increasingly relying on study populations that have no particular relationship to nature—for example, children receiving care from a clinic network targeting low-income populations, or all UK residents younger than retirement age listed in national mortality records for years 2001-2005.

And scientists are routinely taking into account income and other differences in their studies. The question is no longer, *do people living in greener neighborhoods have better health outcomes?* (They do.) Rather, the question has become, *do people living in greener neighborhoods have better health outcomes when we take income and other advantages associated with greener neighborhoods into account?*

The answer is yes. Yes, the benefits of nature that have been intuited and written about through the ages have withstood rigorous scientific scrutiny. Yes, we still find these benefits when we measure them objectively; yes, we still find these benefits when non-nature lovers are included in our studies; and yes, we still find these benefits even when income and other factors that could explain a nature-health link are taken into account. In the face of the tremendously diverse and rigorous tests to which the nature-human health hypothesis has been subjected, the strength, consistency, and convergence of the findings are remarkable.

This monograph presents an overview of what scientists have discovered about the relationship between nature and human health, focusing on the most compelling findings. It focuses on three classic indicators of health drawn from animal research. Studies of laboratory and zoo animals, as well as animals in the wild living in degraded and fragmented habitat tells us that organisms living in unfit habitats undergo social, psychological, and physical breakdown. The scientific study of what Richard Louv has coined “nature deficit disorder” in people mirrors the animal research on unfit habitats. When we compare people with more versus less ready access to parks and other green environments, we find that they exhibit differences in well-being and functioning in each of the three trademark domains: social, psychological, and physical health.

Just as rats and other laboratory animals housed in unfit environments undergo systematic breakdowns in healthy, positive patterns of social functioning, so too do people. In greener settings – rooms, buildings, neighborhoods, and larger areas with more vegetation, we find that people are more generous and more desirous of connections with others; we find stronger neighborhood social ties and greater sense of community, more mutual trust and willingness to help others; and we find evidence of healthier social functioning in neighborhood common spaces – more (positive) social interaction in those spaces, greater shared use of spaces by adults and children. In less green environments, we find higher rates of aggression, violence, violent crime, and property crime – even after controlling for income and other differences. We also find more evidence of loneliness and more individuals reporting inadequate social support.

Access to nature, whether it is in the form of bona fide natural areas or in bits or views of nature, impacts psychological, as well as social functioning. Greater access to green views and green environments yields better cognitive functioning; more proactive, more effective patterns of life functioning; more self-discipline and more impulse control; greater mental health overall; and greater resilience in response to stressful life events. Less access to nature is linked to exacerbated attention deficit/hyperactivity disorder symptoms, more sadness and higher rates of clinical depression. People with less access to nature are more prone to stress and anxiety, as reflected not only individuals’ self-report but also measures of pulse rate, blood pressure, and stress-related patterns of nervous system and endocrine system anxiety, as well as physician-diagnosed anxiety disorders.

The impacts of parks and green environments on human health extend beyond social and psychological health outcomes to include physical health outcomes. Greener environments enhance recovery from surgery, enable and support higher levels of physical activity, improve immune system functioning, help diabetics achieve healthier blood glucose levels, and improve functional health status and independent living skills among older adults. By contrast, environments with less green are associated with greater rates of childhood obesity; higher rates of 15 out of 24 categories of physician-diagnosed diseases, including cardiovascular diseases; and higher rates of mortality in younger and older adults. Most important, all of these studies take into account the role that income might play in an apparent link between access to nature and physical health outcomes. While it is true that richer people tend to have both greater access to nature and better physical health outcomes, the comparisons here show that people *of the same socio-economic status* who have greater access to nature have better physical health outcomes.

Rarely do the scientific findings on any question align so clearly. While for scientists the search for greater understanding of how and why and when contact with nature impacts health continues, for society as a whole the findings are clear. Parks and other green environments are an essential component of a healthy human habitat. While street trees, parks, and public green spaces are often regarded as mere amenities—ways to beautify our communities and make life a little more pleasant, the science tells us that they play a central role in human health and healthy human functioning. Much like eating greens provides essential nutrients, so does seeing and being around green. To promote a healthier, kinder, smarter, more effective, more resilient, more vital populace, communities should be designed to provide every individual with regular, diverse sources of “Vitamin G.”

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BIOGRAPHICAL PROFILE

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Frances E. (Ming) Kuo is a nationally and internationally recognized scientist examining the impacts of urban landscapes on human health. Her research focuses on how the presence of trees, grass, and other natural elements within the settings of daily life supports healthy human functioning in both individuals and communities. Starting in 1993, she led a series of studies on the impacts of green residential spaces on human functioning in inner city Chicago, for which she and her collaborators received the Environmental Design Research Association's Achievement Award. Subsequently, she and her former student Dr. Andrea Faber Taylor began examining the impacts of green spaces on Attention Deficit/Hyperactivity Disorder (AD/HD); that line of investigation has yielded both rigorously controlled evidence of a cause-and-effect relationship between physical environments and AD/HD symptoms, as well as a large, national study documenting the generalizability of this relationship. Currently, in addition to her AD/HD work, Dr. Kuo is investigating positive impacts of schoolyard environments on students' academic achievement (as measured by standardized test scores), as well as how residential environments can support active living among older adults. Dr. Kuo's work has convincingly linked healthy urban ecosystems to stronger, safer neighborhoods, lower crime, reduced AD/HD symptoms, reduced aggression, and an array of mental health indicators.

Dr. Kuo is regularly asked to keynote at national and international venues. Her work is of interest to a wide range of audiences: the 22-nation European COST (Co-operation of Scientific and Technical Research) on Health and the Natural Environment, the North American Association of Environmental Educators, the International Horticultural Congress, the International Society for Urban Health, the Environmental Design Research Association, the American Association for the Advancement of Science, and an international meeting on Environmental Psychology in Zurich.

Dr. Kuo's work is having impacts on environmental policy nationally and internationally. Within the U.S., Dr. Kuo's work was instrumental in a \$10 million tree planting in Chicago—the largest in the City's history—and in transforming

the face of public housing in Chicago. She has given invited testimony to the U.S. Secretary of Agriculture's National Urban & Community Forestry Advisory Council on multiple occasions, and her work was used to successfully argue for an urban forestry resolution at the U.S. Conference of Mayors. The United States Centers for Disease Control and Prevention (CDC), the United States Department of Agriculture, and the National Institutes of Health have consulted with her in developing research agenda. Recently, Dr. Kuo assisted in the development of Sustainable Sites guidelines, a LEED-style credit system for sustainable landscapes that is receiving national and international attention. She is currently assisting in developing sustainable landscaping guidelines for the U.S. federal government, and her work has been used by agencies and organizations in Wales, Canada, the Netherlands, and the Caribbean to argue for the preservation and expansion of urban greenspace.

The media has taken great interest in the relationship between urban green space and human health. Dr. Kuo's work has been featured on CNN's *Headline News*, NPR's *All Things Considered*, *The Today Show*, *Good morning America*, and a PBS documentary *The Forests Where We Live*. Newspaper coverage includes articles in the *New York Times*, *Washington Post*, *Dallas Morning News*, *Philadelphia Inquirer*, *Seattle Times*, *Chicago Tribune*, *Wall Street Journal*, and *New Jersey Sentinel*, as well as articles in Canada, UK, Germany, Poland, and Chile. The Salt Lake City Olympic Committee highlighted her work as a part of its "Healthy Environments, Healthy People" theme for the 2001 Games.

Dr. Kuo is a faculty member at the University of Illinois at Urbana-Champaign, where she directs the multidisciplinary Landscape and Human Health Laboratory. She holds appointments in both the Department of Natural Resources and Environmental Sciences and in the Department of Psychology. Her background is in cognitive psychology and environmental psychology, with degrees from the University of California, Berkeley (M.A.) and the University of Michigan (Ph.D.).



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