FEATURE

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URBAN FORESTS FOR HUMAN HEALTH

Dr Kathleen L. Wolf, explores the myriad benefits of increased investment in the urban forest.

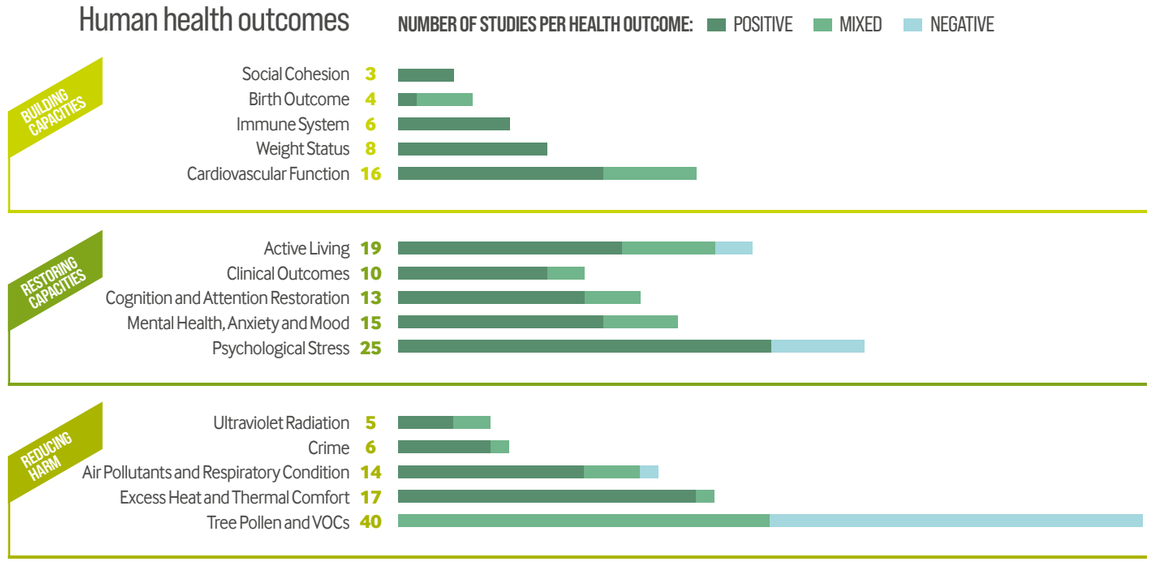
Why should a community invest in trees and the urban forest? Having good answers ready for this question is important as arboriculturists and urban foresters are often challenged to justify the costs of tree planting, planting and management. There may be even greater budget challenges as clients and agencies grapple with financial implications of the COVID-19 era. i-Tree and other tools can be used to assess environmental services (such as stormwater management or carbon sequestration) and even assign economic value. Human wellbeing and community health is an additional opportunity to respond to the question - a focus on public health often resonates strongly with the general public and local leaders.

Research from the past 40 years confirms the many human health benefits gained from experiences of nature in cities. Literally thousands of peer-reviewed studies describe a wide range of health benefits that are generally presented as physical, mental and social health. Specifically, what is the scientific evidence of city trees and human health? To answer this question, I collaborated with a team of investigators to assemble a collection of the studies, review the research and provide a comprehensive summary of the findings. The results can inform city policy and planning, and perhaps even shape decisions about where to place trees or manage woodlands.

Our team included experts in medicine, public health and urban planning, as well as urban forestry. We started the systematic search using keywords representing human health, environmental health, and urban forestry, and explored multiple science publications databases. We initially identified 3,358 articles and screened them for duplicates and relevance. Only articles published in English were retained. The final step was an appraisal of science quality, further reducing the count.

The final collection of 201 studies were sorted into a three-part conceptual framework. Reducing Harm, representing 41% of studies, describes how trees mitigate the conditions that can compromise human health, including topics such as air pollution, ultraviolet radiation, heat exposure, and pollen. Restoring Capacities, at 31%, addresses how experiences of trees can ease recovery from persistent and clinical health challenges, and includes attention restoration, mental health improvement, stress reduction, and clinical outcomes. Building Capacities, at 28% of the collection, describes how the presence of trees sets up the conditions or behaviors that promote better health, and includes topics such as birth outcomes, active living, and weight status.

When exploring the collection for other patterns we observed that there has been a surge of science in just the last decade. The interest in the human health associations with trees aligns with the broader societal interest in urban forestry in recent years. The studies are heterogeneous in their research approach, methods and analysis. The tree experiences that were tested included time spent immersed in parks or woodlands (walking or stationary), single trees, views of trees or forests, and images or video simulations. Some of the results were less robust due to either research design that didn't meet the standard of randomized controlled trials or simply that few studies have been done to date. Studies were conducted primarily in North America, western Europe and Asia (including Japan, China and South Korea); few studies were conducted in Africa and South America. Interestingly, we observed that the medical publication databases (such as PubMed) had a preponderance of studies about pollen sensitivity. It may be that healthcare providers are more attuned to trees and allergenicity, but not getting access to the studies that present more diverse and positive health consequences of trees in communities. Better strength of evidence was found for two topics – forest bathing and mental health. Forest bathing, meaning intentional, contemplative, perhaps even meditation-like time spent in and around trees, ranging from a few hours to days, has been studied extensively in Japan. Known as shinrin-yoku, well-crafted studies have confirmed a wide range of benefits such as reduced stress, improved cardiovascular function, reduced diabetes symptoms, and reduced anxiety. An interesting finding is the possible role of forest phytoncides in stimulating better immune response, including human natural killer cells that can block cancer. The extensive evidence of benefit has supported the launch of certification programs for forest therapy/bathing guides in multiple nations.



Numerous studies also address mental health benefits. Even brief amounts of time in the presence of trees and forests reduces the mental stressors that can lead to more serious mental health issues. Walking in nature has been shown to reduce symptoms in patients who are clinically diagnosed with depression. One finding is that time in nature reduces one's inclination to rumination, a psychology term for the tendency of some people to dwell on sad or negative thoughts that lead to reduced happiness and negative emotions. Routine outdoor activity reduces the symptoms of children with ADHD. Some of the most recent research suggests an additional margin of mental health benefit when spending time in more biodiverse landscapes. More ecological landscapes present more complex sensory experiences, draw in our attention without effort, and ease psychological fatigue.

Why do we need trees? They are a proven social determinant of health. They promote wellness, ease disease and make communities healthier places!

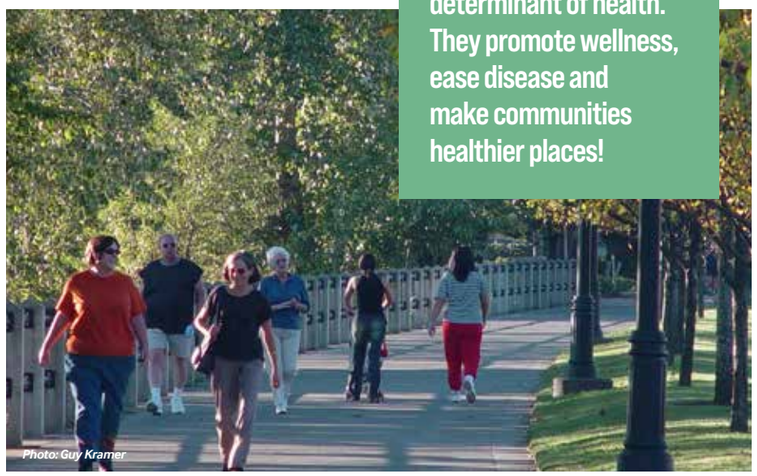


Photo: Guy Kramer

A high-level view of the evidence concerning nature and human health, and with a focus on trees and forests, offers insights about how urban forest planning and management might incorporate urban forestry for community-based health promotion strategies. The evidence about health can be incorporated into urban forest management plans. If a manager is planning tree planting for climate adaptation or tree canopy boost, tree placement could be designed to encourage health response. Green screens of trees can be placed in schoolyards or hospital sites if they abut high volume roads that generate air pollution. Patches of trees can be planted as thermal refuges near residential areas to provide outdoor respite during high heat events. Streetscape trees can be used to emphasize active living or walkability corridors in neighborhoods.

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