



The woodlands of Rock Creek Park in the centre of Washington DC.

GREEN SPACE

A natural high

Exposure to nature makes people happy and could cut mental-health inequalities between the rich and poor.

BY NATASHA GILBERT

Autumn leaves crunch underfoot as I stroll down a path in Rock Creek Park, an urban woodland in Washington DC. I take a deep breath and feel my mood lift. Driving through the busy urban streets to reach the park, I had been worrying about work and what I was going to cook for my family for dinner that evening.

Urban green spaces have value beyond their beauty and environmental importance. Nature improves mental health — people are less depressed when they have better access to green spaces. The beneficial effect is not just a matter of physical exercise, although that is part of the picture. There is something about natural environments that improves people's well-being, says Richard Mitchell, an epidemiologist at Glasgow University, UK. Put simply, being in nature feels good.

Researchers and policymakers are increasingly interested in the link between

green spaces and mood because of the implications it could have for preventing and treating mental-health problems in society, says Hannah Cohen-Cline, a researcher at Providence Health and Services in Portland, Oregon. Spending time outdoors in natural environments not only improves people's mental health, but it could also help to reduce health inequalities between the rich and the poor. "Being around nature makes people feel better mentally. This has important policy implications," says Cohen-Cline.

Poor mental health is one of the biggest public-health problems in Western nations. For instance, the Organisation for Economic Co-operation and Development calculates that mental-health conditions such as depression cost the United Kingdom £70 billion (US\$100 billion) annually in health-care spending and lost productivity. And the epicentre of these problems is cities: a 2010 meta-analysis showed that urban dwellers are roughly 20% more likely to develop anxiety disorders than their rural

counterparts, and nearly 40% more likely to develop mood disorders¹.

DIGGING FOR EVIDENCE

Improving access to green space — such as parks or gardens incorporated into housing developments — in cities could help to cut urban stress, improve city dwellers' mental health and reduce the strain on health-care systems. But until recently, most studies that showed a link between green space and mental health were small, short term and involved groups of similar people, such as students.

"These studies have major limitations," says Mathew White, a social and environmental psychologist at the University of Exeter, UK. It's not clear whether the results are applicable to wider populations or that the beneficial effects persist over time, he says. This is problematic for policymakers who want to see the benefits before investing in health and social interventions.

Scientists are working to tackle these limitations and strengthen the evidence base.

JIM LO SCALZO/EPA/CORBIS

White and his colleagues were the first to study changes in mental health over several years as people moved within urban settings. They found that when people moved to areas with more green space, including tree-lined streets, private gardens and public parks, they were happier for at least three years after their move, and that this feeling of contentment grew over time².

The research ranked movers' well-being using the short-form General Health Questionnaire (GHQ; a standard clinical tool for measuring anxiety and depression on a scale of 0 to 12). White used an inverse of the GHQ scale so that higher scores represented better mental health. The findings showed that when people moved to areas with more green space, their average GHQ score rose from 9.8 two years before their move to 10.1 three years after their move.

The durability of the happiness effect surprised White. He expected the boost to be short-lived because "people adapt to things quickly." Winning the lottery, for instance, typically makes people happier for up to one year, he says. The benefits of moving to greener areas may last even longer than 3 years (the team only looked at 5 years of data in total) — White is planning a larger study to find out.

White acknowledges that, despite lasting longer than expected, the benefits to mental health seem small. Moving to a greener area is only around one-tenth as important for people's happiness as becoming employed, and has one-third of the impact that marriage does, he says. But, White points out, green space has a greater effect on happiness than low crime rate, which is often cited as a key determinant of well-being. And if the small effect of a green space is multiplied by the thousands of people who use it, that adds up to "a large public-health impact," he says.

Until recently, most studies had been unable to control for the genetic variation that sees some people respond more positively to green space, so it has been difficult to definitively say whether the benefits are due to the green space or to a person's genetic makeup. But Cohen-Cline has unpicked the drivers of mental health using twins. Because twins share at least half of their genes, and those who took part in the study were raised in the same environment, the researchers were able to control both the genetic and environmental factors³. "This is important because we know that genetics and childhood environments play a key role in the risk of developing mental-health issues," says Cohen-Cline.

The authors found that green spaces have a direct mental-health impact. People with better access to green space had slightly fewer depressive symptoms than those in less green areas. Independent of any potentially confounding factors, such as childhood environment and genetics, "there is something about green space itself that benefits people's mental health," says Cohen-Cline. Although the twin study shows



Green spaces improve mental and physical health.

that green spaces make people happier, it does not say how this works. "It is doing it through several different pathways, and we are still trying to tease that apart," she says. Exercise is known to improve mood, but Cohen-Cline's study found no evidence that it substantially changed people's depressive score, "suggesting that it is not what is driving the association."

One route could be that parks allow people to socialize, which in turn improves their mood. "Social ties are very strongly associated with mental health," says Cohen-Cline. Mitchell is putting his money on another route — people's perception of nature causes physiological changes, such as reducing the stress hormone cortisol and lowering blood pressure. "You perceive nature with your senses," Mitchell says. "Your brain processes those sensory experiences and triggers physiological responses."

Evidence for why this would be is so far thin, but theories abound. One possibility is that people's brains are overexposed to stressful stimuli such as noise and overcrowding in urban environments. By contrast, Mitchell says, natural environments give the brain an opportunity to recover from mental fatigue. It's also possible that our evolutionary heritage means we are simply hard-wired to respond positively to the green spaces that our ancestors grew up in. "We're faced with stressful, noisy environments. When we encounter an environment that is more in keeping with our evolution, that we might innately perceive as more supportive, our bodies and minds react favourably; we literally relax," says Mitchell.

Whatever the underlying explanation, there is evidence that green spaces elicit a direct physiological response, says Mitchell. In Japan, for example, people who spent time participating in Shinrin-yoku — sitting or walking in a forest — had lower cortisol concentrations, pulse rates and blood pressure than when they visited the city⁴. And it's not

just parks and forests; blue spaces such as the sea, canals and lakes may give an even bigger boost to people's mood⁵.

GREEN INTERVENTION

As the evidence grows, policymakers will be able to design health interventions that use natural resources. The therapeutic and societal value of green spaces is already starting to draw attention. "Policymakers are taking on the message that they have a resource that might be good for people's health and well-being," says Mitchell. The £8.9-million restoration of Clissold Park in northeast London in 2011, for instance, was highlighted by the UK government agency Public Health England in 2014 as an example of a local health intervention.

But creating the spaces isn't enough — says White, there are strong "psychological barriers" that prevent some people from using green space. Just 40% of the UK population will spend time near nature in any given week, and although a lack of time is the main reason given, he says, others say they don't enjoy spending time outside, or that it's not part of their culture.

To engage those most in need, White thinks that health services should offer people with depression 'green prescriptions', which would encourage them to join walking groups or allotments, for example. Physicians could offer this before or as well as drug treatments. White is attempting to work out how these green prescriptions could work in practice, and the potential cost saving for health services.

If participation can be improved, one area that may benefit the most is health inequality. Contentment is not evenly distributed across the socio-economic spectrum: affluence is generally associated with greater happiness. But evidence is beginning to show that green spaces could narrow this gap. Mitchell and his colleagues found that access to green spaces could reduce inequality in mental well-being by 40%⁶.

"It is a sizable reduction. Nothing else governments have tried has really had much impact," says Mitchell. The study has its limitations — despite the strong association between green space and decreasing mental-health inequality, there's no proof of causation — but Mitchell is clear: "having a park in your neighbourhood has a greater benefit on poorer people."

"The effects are largest in poorer communities," says White. "Rich people are healthy already." ■

Natasha Gilbert is a science writer based in Washington DC.

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