A Dose-Response Curve Describing the Relationship Between Urban Tree Cover Density and Self-Reported Stress Recovery

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http://eab.sagepub.com/content/early/2014/09/24/0013916514552321.abstract

ABSTRACT:
Although it is well established that viewing nature can help individuals
recover from a stressful experience, the dose-response curve describing
the relationship between tree cover density and stress recovery is totally
unclear. A total of 160 participants engaged in a standard Trier Social Stress
Test to induce stress. Participants were then randomly assigned to watch
1 of 10 three-dimensional videos of street scenes that varied in the density
of tree cover (from 2% to 62%). Participants completed a Visual Analog
Scale questionnaire at three points in the experiment. Analysis revealed a
positive, linear association between the density of urban street trees and
self-reported stress recovery, adjusted $R2 = .05$, $F(1, 149) = 8.53$, $p < .01$.
This relationship holds after controlling for gender, age, and baseline stress
levels. A content analysis of participants' written narratives revealed a
similar but even stronger association. These findings suggest that viewing
tree canopy in communities can significantly aid stress recovery and that
every tree matters.

A dose of nature: Tree cover, stress reduction, and gender differences

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http://willsull.net/resources/Sullivan-papers/JiangChangSullivan2014.pdf

ABSTRACT:
Although it is well established that exposure to nearby nature can help reduce stress in individuals, the
shape of the dose–response curve is entirely unclear. To establish this dose–response curve, we
recruited
160 individuals for a laboratory experiment. Participants engaged in the Trier Social Stress Test (TSST)
to induce psychological stress, and were then randomly assigned to view one of ten, 6-min, 3-D videos
of neighborhood streets. The density of tree cover in the videos varied from 1.7% to 62.0%. We
measured their stress reactions by assessing salivary cortisol and skin conductance levels. Results show a
clear disparity between women and men. For women, we found no relationship between varying
densities of tree cover and stress recovery. For men, the dose–response curve was an inverted-U shape:
as tree cover density increased from 1.7% to 24%, stress recovery increased. Tree density between 24%
to 34% resulted in no change in stress recovery. Tree densities above 34% were associated with slower
recovery times. A quadratic regression using tree cover density as the independent variable and a
summary stress index as the dependent variable substantiated these results [$R2 = .22$, $F (2, 68) = 9.70$, $p
< .001$]. The implications for our understanding of the impacts of nearby nature, and for the practice of
planning and landscape architecture are discussed.