



# ECHO

Environmental influences  
on Child Health Outcomes

A program supported by the NIH

## Study Summary

### ***ECHO Study Suggests Living Near Green Space Is Associated with Lower Anxiety and Depression in Preschool-Age Kids***

*Author(s): Nissa Towe-Goodman*

#### Who sponsored this study?

The Environmental influences on Child Health Outcomes (ECHO) Program, Office of the Director, National Institutes of Health supported this research.

#### Why was this study needed?

While previous research has suggested that access to nature is important for mental health, there are a limited number of studies that have examined these effects on young children. ECHO investigators addressed this research gap by looking at whether exposure to green space was associated with internalizing symptoms (e.g., anxiety, depression) and externalizing symptoms (e.g., aggression, rule-breaking) among children.

#### What were the study results?

The ECHO researchers found that higher levels of green spaces, up to three-fourths of a mile from a child's home, were linked with lower symptoms of anxiety and depression from ages 2 to 5. Although green space was also linked with symptoms of aggression and rule-breaking in early childhood, this association was reduced after accounting for factors such as poverty levels, unemployment, and housing costs. Researchers found no significant association between residential green space and internalizing or externalizing symptoms in middle childhood, ages 6 to 11.

Note: Results reported here are for a single study. Other or future studies may provide new information or different results. You should not make changes to your health without first consulting your healthcare professional.

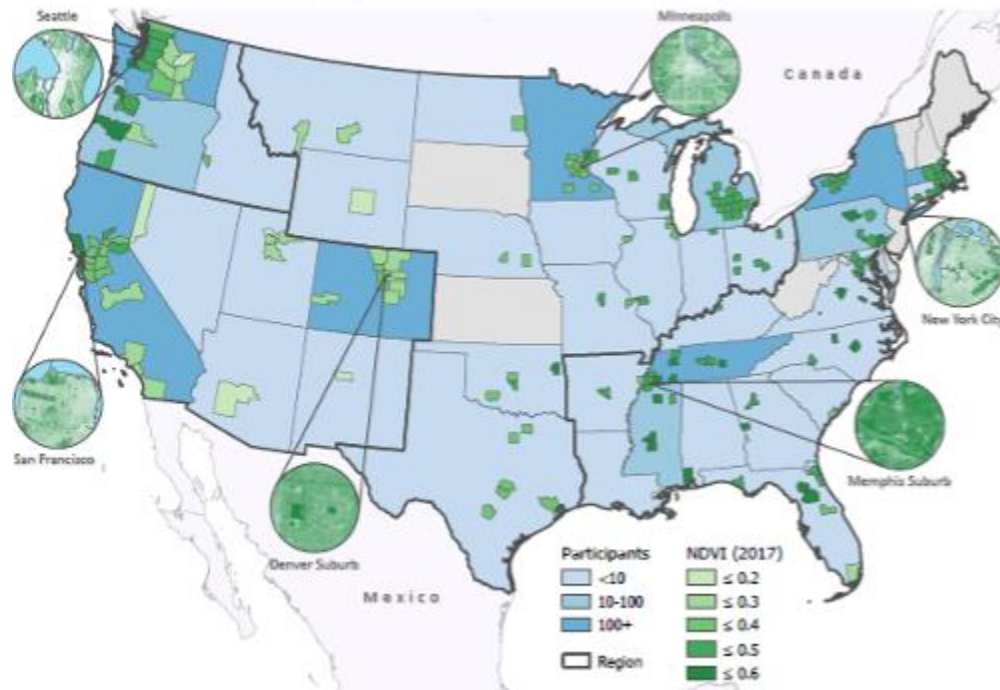
#### What was the study's impact?

Most research evaluating the effect of green space on health so far has been limited in children and studied one or a few cities at a time. ECHO Program researchers were able to examine data from children in 199 counties across 41 U.S. states, exploring the connection between exposure to green spaces from birth and anxiety, depression, aggression, and other symptoms during early or middle childhood. These findings suggest that green initiatives such as parks, urban forest programs, or protected natural areas may influence early emerging anxiety and depression symptoms.

## Who was involved?

The 2,103 children included in the study were born between 2007 and 2013 and ranged in age from 2 to 11, spanning early and middle childhood.

A. Distribution of included ECHO participants across the United States with greenspace in residential counties.



## What happened during the study?

Researchers analyzed information from parents who completed the Child Behavior Checklist for their children from ages 2 to 11 and combined this data with the family's residential address since the child was born and satellite-based imagery of vegetation density around their homes. Green space exposure was measured using the Normalized Difference Vegetation Index (NDVI), a widely used metric for quantifying vegetation density using sensor data. NDVI values range from -1 to 1. High NDVI values (approximately 0.6 to 0.9) represent dense vegetation, such as forests; values approaching 0 represent areas without live vegetation.

## What happens next?

Future studies can explore the types of natural areas linked with early mental health and examine the role of green space around schools. Investigating how early exposure to nature influences mental health into adolescence and adulthood could also be an important area to study.

Where can I learn more?

Access the full journal article, titled “Green space and internalizing or externalizing symptoms among children,” in [JAMA Network Open](#).

*The content is the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.*