

# Expert explores how sunlight may affect ADHD patients

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Researchers are interested in exploring how sunlight, sleep and screens (like those on computers and TVs) may affect those with attention-deficit/hyperactivity disorder (ADHD), says Dr. L. Eugene Arnold, a child psychiatrist and ADHD expert at the Ohio State University Wexner Medical Center's Nisonger Center.

ADHD is a [neurodevelopmental disorder](#) characterized by developmentally inappropriate degrees of inattentiveness, impulsivity and hyperactivity. Although ADHD is the most common neuropsychiatric/behavioral disorder of childhood and has been extensively studied in young children, it occurs in all age groups.

An estimated 13 million men, women and children in the United States fit the diagnosis for ADHD or one of its subcategories, says Arnold, who is professor emeritus of psychiatry at The Ohio State University, where he was formerly director of the division of child and adolescent psychiatry and vice chair of psychiatry.

Arnold collaborated with Dr. Martijn Arns of the Netherlands on a recent study published in *Biological Psychiatry* that sheds new light on the increasing rates of prevalence of ADHD. This study found that "sunny" regions with high solar intensity, such as the U.S. states of California, Arizona, and Colorado, and countries like Spain and Mexico, have lower prevalence of ADHD. An apparent protective effect of [sunlight](#) accounted for 34-57 percent of the variation in ADHD prevalence. The authors speculate that this may be related to sunlight's

effects on preventing disturbance circadian rhythm or "[biological clock](#)."

Researchers from Utrecht University, Research Institute Brainclinics, Leiden University, and Ohio State University published their work suggesting a possible preventive effect of sunlight on ADHD. Examining ADHD prevalence rates per U.S. state and solar intensity maps, the authors observed a striking geographical coincidence between low ADHD prevalence and high solar intensity. Solar intensity is a measure of how much sunlight a specific area receives, which is often used for calculating how much energy solar panels will generate.

States with less sunlight had higher rates of patients diagnosed with ADHD, as much as 10 to 12 percent. But in states where there is more sunshine, there are fewer cases.

"Those states have about, say, 5 or 6 percent rate of ADHD. So, it's about a 2-to-1 ratio," says Arnold. "There are many possible explanations. For example, with more sunlight, maybe kids get out more to play and get more of the exercise that, increasingly, we know is good for brain function."

But sunlight may not be the only issue. Arnold says there may also be a link to sleep, since those with ADHD have the same traits as those who are sleep-deprived.

"There's a correlation with things like irritability, impulsiveness, inattentiveness - which are core symptoms of ADHD," says Arnold. "And what's robbing them of sleep may be their computer and TV screens. They emit a blue light that could be disrupting melatonin, which is the hormone that helps regulate sleep. Children's duration of sleep has decreased over the past decade or two, since the introduction of those electronic devices."

The authors hypothesize that this delayed circadian rhythm and difficulty falling asleep may be caused by increased evening use of modern media, such as tablet computers and smart phones, especially with social media increasing the exposure to such blue-light sources during the evening.

"By preventing the onset of melatonin, blue light delays the onset of sleep and that disrupts the sleep-wake cycle," says Arnold. "More studies are needed to better understand these potential connections with ADHD."

In an interesting twist, experts say the rates of ADHD may be lower in states with brighter sunshine because sunlight actually overrides the blue-light effect that comes from TV and computer screens.

"The main value of this particular study is that it opens up new vistas, new things to be investigated that maybe we hadn't quite thought about before," says Arnold.

He is currently involved in two treatment studies of ADHD and three treatment studies of autism. Arnold has more than 40 years of experience in child psychiatric research, including the multi-site NIMH Multimodal Treatment Study of Children with ADHD.

Provided by Ohio State University Medical Center

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