

THE HUMAN BENEFITS OF DAYLIGHT IN **ATTENTION & COGNITIVE PERFORMANCE**

A White Paper on Daylighting and Human Health

Executive Summary

The capacity for sustained attention and high-level cognitive performance is the foundation of productivity - in a corporate office, a school classroom, or a home office. Yet the physical environments in which people learn and work are frequently designed in ways that undermine these very capacities. Among environmental variables, the quality and quantity of natural daylight are powerful and actionable influences on cognitive function. A robust body of research indicates that natural daylight exposure is associated with enhanced alertness, improved sustained attention, faster cognitive processing, and superior academic outcomes. For individuals with attention-related challenges, including Attention-Deficit/Hyperactivity Disorder (ADHD), the design of the luminous environment is not merely a matter of comfort but a meaningful design consideration.



How Daylight Affects the Brain

The influence of light on cognitive performance operates through well-established biological pathways. A specialized class of photoreceptors in the retina - intrinsically photosensitive retinal ganglion cells (ipRGCs) - are particularly responsive to short-wavelength light, including the blue-rich wavelengths abundant in natural daylight.¹ These cells project to non-visual brain centers, including the master circadian clock and other regions involved in sleep-wake regulation, alertness, mood, and cognition.²

The most immediate cognitive benefit of natural daylight is the promotion of wakefulness and alertness. Bright daytime daylight can reduce sleepiness and promote alertness through the brain's non-visual light-response system; its daytime alerting effects do not depend simply on melatonin suppression or cortisol release.³ This can support the brain's capacity for focused attention, working memory, and executive function.

A recent study led by University of Manchester neuroscientists found that brighter recent light exposure was associated with sustained-attention and working-memory reaction speeds approximately 7 to 10 percent faster than under dim conditions, measured in everyday life rather than a controlled laboratory⁴. Although the study measured total personal light exposure from natural and artificial sources, its findings support the cognitive value of brighter daytime environments.

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The Research on Daylighting and Performance



Classrooms with the most daylight progressed **20% faster on math tests** and **26% faster on reading tests**

One of the most frequently referenced studies linking classroom daylighting to academic performance was conducted by the Heschong Mahone Group, which analyzed standardized test results from more than 21,000 students across three school districts. Using statistical analyses that accounted for multiple student, classroom, and school characteristics, the researchers found that students in the most daylight classrooms in California's Capistrano district demonstrated 20% greater improvement in standardized math test scores and 26% greater improvement in reading scores over one school year, compared with students in the least daylit classrooms..⁵ A subsequent office study found associations between windows, views, daylight and selected measures of worker performance, although results varied by outcome.⁶

Natural light can also provide high-quality visual conditions for reading and working, reducing the effort required to process information and the physical discomforts that divert attention from the task at hand. Research by Professor Alan Hedge and Danny Nou compared offices with glare-controlling electrochromic glazing against offices with conventional low-e glazing and blinds. Workers in the optimized daylight condition reported 51% less eyestrain and 63% fewer headaches.⁷ Whether a student is studying at home or an executive is analyzing a report in the office, reducing these physical discomforts can help remove distractions from demanding visual work.

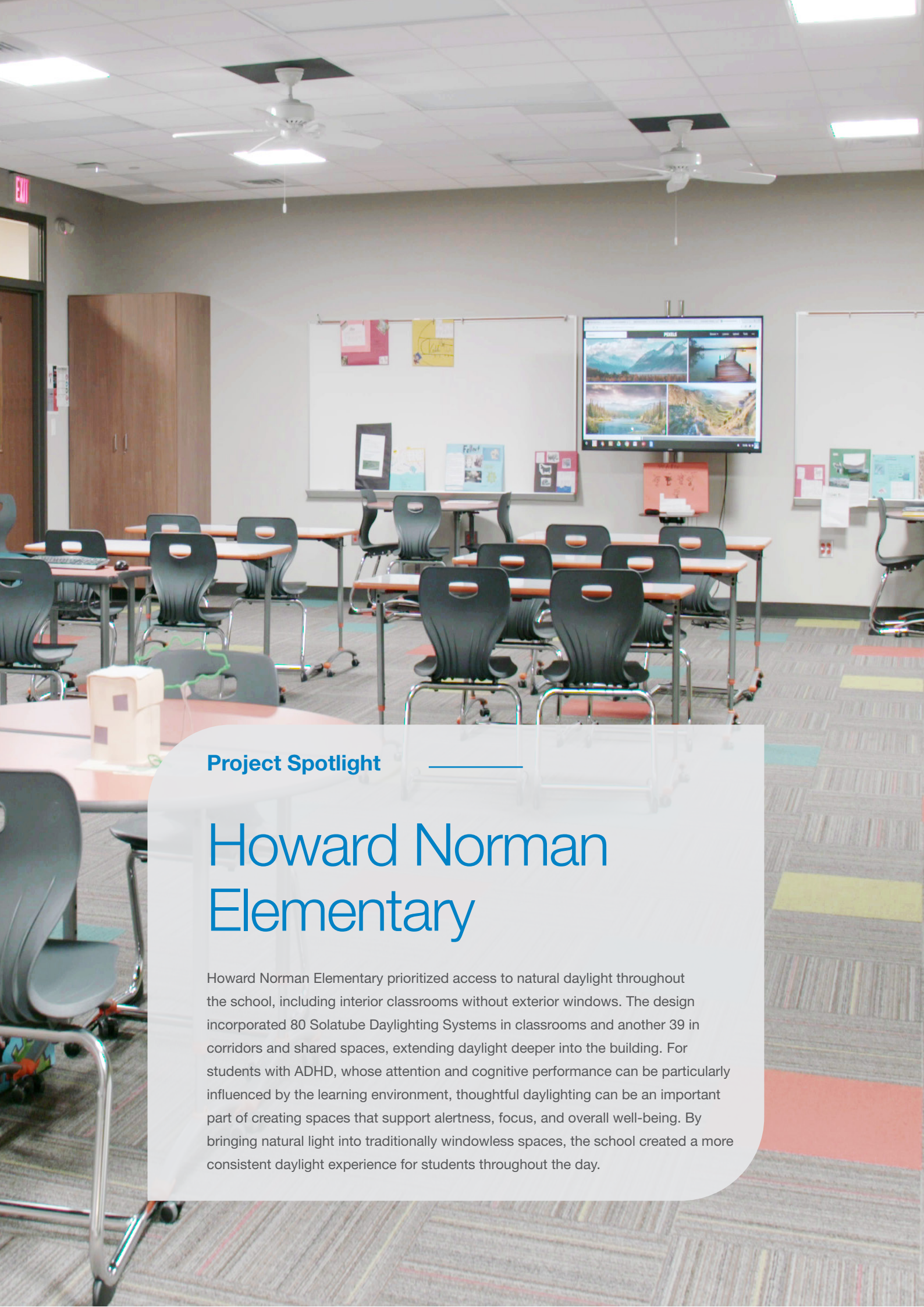


Daylighting and ADHD

Attention-Deficit/Hyperactivity Disorder affects an estimated 5 to 7 percent of school-age children and 2.5 to 4 percent of adults globally.⁸ While ADHD has a strong genetic component, environmental factors can significantly modulate the expression of its symptoms. Emerging research has identified important chronobiological dimensions of ADHD in addition to its effects on attention and executive function. A 2025 review reported that an estimated 73 to 78 percent of children and adults with ADHD have a delayed sleep-wake cycle.⁹ This delay can manifest as difficulty falling asleep at night, difficulty waking in the morning, and chronic sleep deprivation that exacerbates the core symptoms of ADHD, impairing attention, working memory, and impulse control.¹⁰ In a small pilot study, morning bright-light therapy advanced delayed circadian timing, and greater phase advancement predicted improvement in self-reported ADHD symptoms among adults who remained on stable medication.¹¹

Many individuals with ADHD also experience sensory processing differences, including heightened sensitivity to visual stimuli.¹² Harsh or flickering artificial lighting can be a source of distraction and sensory stress, competing for attentional resources and making it harder to filter out irrelevant stimuli. A small 2024 EEG study found that uncomfortable combinations of lighting and sound affected participants with and without ADHD differently, providing preliminary evidence that the sensory environment warrants careful consideration in neuro-inclusive design.¹³

Natural daylight, when properly directed to control glare and contrast, can help address both circadian and sensory needs. Carefully placed/diffused daylight can provide a calm, consistent visual environment, while exposure to bright morning light is an established tool for advancing delayed circadian timing and supporting daytime alertness. Attention Restoration Theory further supports pairing daylight with views of nature: exposure to natural environments can help replenish directed attention and support sustained focus.¹⁴



Project Spotlight

Howard Norman Elementary

Howard Norman Elementary prioritized access to natural daylight throughout the school, including interior classrooms without exterior windows. The design incorporated 80 Solatube Daylighting Systems in classrooms and another 39 in corridors and shared spaces, extending daylight deeper into the building. For students with ADHD, whose attention and cognitive performance can be particularly influenced by the learning environment, thoughtful daylighting can be an important part of creating spaces that support alertness, focus, and overall well-being. By bringing natural light into traditionally windowless spaces, the school created a more consistent daylight experience for students throughout the day.

Practical Implications for Design

The evidence points to several straightforward priorities. Natural daylight should be treated as a primary design resource or reliable interior illumination, not a perimeter amenity. In large homes, commercial, industrial, and institutional buildings, top-lighting strategies such as tubular daylighting devices (TDDs) offer a practical solution for delivering natural daylight to interior zones — from windowless home offices to central school corridors — that cannot be served by conventional windows. Primary learning and working spaces should be designed to receive ample, well-distributed, and glare-controlled daylight, particularly earlier in the day. And wherever possible, daylighting should be paired with views of outdoor greenery or sky, providing the restorative visual connection to nature that supports sustained cognitive performance throughout the day.

Conclusion

From the Heschong Mahone findings linking daylit classrooms with academic performance improvements, to the University of Manchester's real-world findings of reaction times approximately 7 to 10 percent faster under brighter recent light exposure, to the growing evidence connecting ADHD with circadian disruption, the science consistently points in the same direction: bright daytime light and well-designed daylighting can support alertness, attention, and cognitive performance. For architects, educators, facility managers, and homeowners, designing spaces that maximize access to high-quality, well-distributed, glare-free natural daylight is an investment in environments that support the cognitive capacity, achievement, and productivity of the people who inhabit them.



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