SYNOPSIS

KEY POINT SUMMARY

OBJECTIVES

To discuss research concerning how architecture and other domains of science can help address the need for meaningful decisions in daylighting design.

Unweaving the human response in daylighting design

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Key Concepts/Context

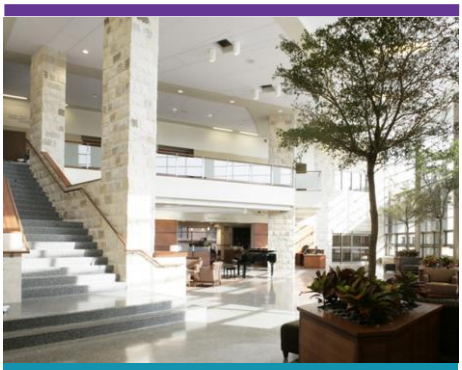
The term "daylighting" can be broadly defined as the amount of natural light that is present within a given space due to its structural makeup. Structural designs that allow for certain levels of daylighting may have a positive impact on energy use, since lighting is one of the most energy-demanding building functions. Previous studies have also shown that daylight can positively impact patient health outcomes and overall patient experiences within healthcare environments. This paper synthesizes a wide array of architectural and scientific studies in order to propose goal-based strategies for designs that promote "good daylighting."

Methods

This study draws together information from 118 published research articles in order to define "good daylighting" practices in structures while also providing insight into human reactions towards daylight. Information is organized into two main categories: dynamic daylighting for variable and diverse human occupants, and decision support for human designers. The study focuses on two types of modular units used for determining illuminance values across time: LightSolve Modules and Lightsolve Services. The Raytracing Engine and Lighting Simulation Engine are also discussed.

Findings

Five declinations of "good daylighting" goals were formed through this study's review of relevant literature. These goals include: workplane illuminance for visual tasks, mitigation of discomforting glare, managing solar gains, managing non-visual lighting effects (such as circadian rhythm influence), and overall perceptual daylight.



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The authors suggest the adoption of the "Lightsolve simulation framework," which can help inform the early stages of building design by addressing the five declinations mentioned above.

Limitations

This study synthesizes the findings of other studies in order to reach its conclusions; accordingly, no original data are gathered and no original experiments are conducted.

Design Implications

Natural lighting can be a cost-effective and environmentally sound way to promote the efficacy of healing environments. Designers could consider employing the "Lightsolve simulation framework" described in this article to help inform the early stages of the structural design process with regard to natural lighting. Since natural lighting is known to have positive effects on health and environmental appeal, it is important to allow natural light into a space while mitigating harmful glares or notable temperature increases.