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An Ergonomic Criteria for Domestic Lighting Design and Evaluation

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Abstract:

Statement of the problem: lighting design relies on natural and artificial light sources to provide visual comfort in comfortable spaces. However, there is limited knowledge about ergonomic lighting design in interior spaces. Multiple and homogeneous lighting design approaches can create uncomfortable and un-holistic environments. A comprehensive and harmonious lighting design approach with specific design criteria is needed. **Objectives:** The aim of this paper is to provide designers and non-specialists awareness of the design and judgment and lighting conditions. The ultimate goal has been to develop guidelines for ergonomic criteria for the proposal, design, and evaluation of lighting conditions in domestic spaces. It also targets the establishment of an ergonomic evaluation criterion for domestic lighting based on the functions of home activities. And to validate the established criterion through case analysis of residential units, taking into consideration the levels of visual comfort and accessibility. **Significance:** The study suggests operational definitions, measurable variables, and manipulation strategies for light installations, allowing luminaires and controls to be adjusted based on current conditions. Strategies should be designed to analyze lighting designs and identify dysfunction. The study also guides a gradual transition from a lighting design with performance defects to evaluations without defects, considering the systematic impact of light variation strategies, avoiding blind or intuitive implementation. **Method:** This study has established a controlled criteria and evaluating lighting quality in family rooms, bedrooms, kitchens, and computer workstations in home environments through an inductive approach. Using an analytical descriptive approach, the study outlined lighting systems, fixture selections, light sources, dimming automation, task/ambient lighting ratios, luminance levels, lamp distribution patterns, and existing installations in domestic activity areas that don't meet the developed design criterion. **Results:** The study examined the design of interior and exterior residential lighting, focusing on artificial light distribution, lamps, luminaires, surface and ceiling lighting, and their visual impact. It also explored how activities influence lighting design and evaluated visual comfort methods. The study developed an ergonomic evaluation criterion for domestic lighting, including base formulas and numerical values, to analyze domestic lighting accessibility. The study will validate the proposed criterion through case studies of residential units, considering visual and theoretical analysis, and the influenced home activity type.

Keywords:

Ergonomic Criteria, Domestic Lighting, Design Evaluation, Lighting fixtures, illumination, Visual Perception, Visual Comfort

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