

### **Lighting and its relationship to visual function of older adults: A pilot study**

Jennifer Kaldenberg<sup>1,2</sup>, Sue Berger<sup>3</sup>, Y.K. Gary Chu<sup>1,2</sup>, Karen Huefner<sup>3</sup>, Anne Escher<sup>4</sup>

<sup>1</sup>*New England College of Optometry, Boston, MA, United States*, <sup>2</sup>*New Eglang Eye Institute, Boston, MA, United States*, <sup>3</sup>*Boston University, Boston, MA, United States*, <sup>4</sup>*Massachusetts General Hospital, Boston, MA, United States*

Visual impairment affects nearly 14 million Americans and 161 million people worldwide, many of whom desire to age in place or remain in their communities. Yet, the environments in which people reside may inhibit participation in their desired occupations. In addition, normative aging changes to the eye including thickening and yellowing of the lens and smaller pupils increase an older adult's need for greater illumination. The average older adult requires 3-4 times greater illumination than a younger person.

The purpose of this study was to understand how the physical environment, in general, and specifically lighting, influences safety and participation of older adults. For this study ten buildings and 113 individual apartments were evaluated, all subsidized housing in an urban environment. Lighting measurements were taken in 5 areas throughout the home with minimum and maximum levels recorded. In addition, information on available task lighting, number of lamps, and position of lights was noted. Hazards within the home were also assessed, looking at furniture arrangement, clutter, and walkways. Contrast of furniture with walls and floors and availability and use of adaptive equipment such as bath benches and grab bars were also noted.

Common lighting concerns found in all living environments included no ceiling fixtures or ambient lighting, low levels of task lighting, broken fixtures or burnt out bulbs, and/or improperly positioned or inadequate task lighting. Other environmental issues included clutter or narrow walkways, glare from windows without shades, loose rugs, low contrast adaptive equipment, poor contrast mailboxes, call buzzers and message boards with small print, low contrast key holes, and low contrast furniture in common areas.

Results of this study demonstrate the need for improved lighting and hazard reduction. Lighting levels found were consistently below recommended levels and often below standard levels, hindering older adults' ability to navigate their environments and perform desired activities safely. When assessing environments of older adults, and specifically those living with visual impairment, occupational therapists should measure light levels, and consider glare, contrast, and balance of task versus ambient lighting. Intervention to address these issues must be considered to assure safe and independent participation in occupations.