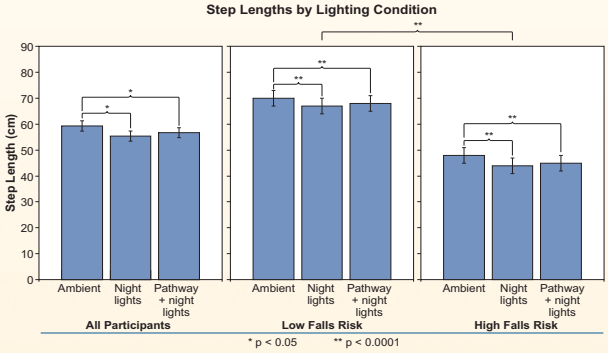
Innovative Lighting Technique Reduces Risk for Falls in Older Adults

Risks for falls increase with age and pose a major threat to the independence of older adults. The visual system plays an important role in maintaining balance, so age-related changes to the visual system can compromise postural stability. LRC researchers have designed two night-lighting systems that provide low ambient light, together with enhanced visual elements using linear arrays of light-emitting diodes (LEDs) or lasers. One system provided horizontal and vertical cues, accomplished by using linear LED arrays placed vertically along the sides of a doorframe and horizontally along the top of the doorframe, and a second system had laser lines outlining the pathway. By enhancing spatial elements in the room, older individuals can better orient themselves to the environment, thereby improving their balance.

LEDs give horizontal and vertical cues around the doorway.



Average ± standard error of the mean (SEM) for step length under the three lighting conditions. Average values for all participants are shown together with those for high falls risk and low falls risk.

Publications

Figueiro MG, Plitnick B, Rea MS, Gras LZ, Rea MS. 2011. Lighting and perceptual cues: Effects on gait measures of older adults at high and low risk for falls. *BMC Geriatrics*, 11:49.

Figueiro MG, Gras LZ, Rea MS, Plitnick B, Rea MS. 2011. Lighting for improving balance in older adults with and without risk for falls. *Age and Ageing*, in press.

Sponsor

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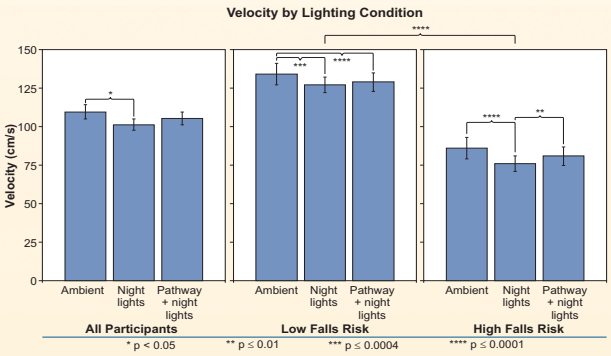
Experiment

These new lighting techniques were tested with participants ages 65 and older who were categorized into two groups: those with a high risk and those with a low risk of falls. Participants were exposed to three lighting conditions: high, daylight-like light level provided by ceiling lights; low light level typical of a conventional wall-plug night light; and one of the novel night lighting systems, either using the horizontal and vertical LED arrays or the laser lines outlining the pathway.

Results

Using standardized tests for balance and gait measures, the data showed that the enhanced horizontal and vertical LED system enabled both groups to maintain balance significantly better than the wall-plug night light condition when transitioning from a sitting to a standing position. While walking, the laser lines outlining the pathway significantly increased velocity and reduced step length variability compared to traditional wall-plug night lights. These studies demonstrated that a novel night lighting system providing robust spatial cues is a practical and effective aid in reducing falls risk at night for older adults.

Red laser lines on the floor outline the pathway.



Average ±SEM of velocity under the three lighting conditions. Average values for all participants are shown together with those for high falls risk and low falls risk.

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Lighting Research Center

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