Reading Function Improves with Task Lighting

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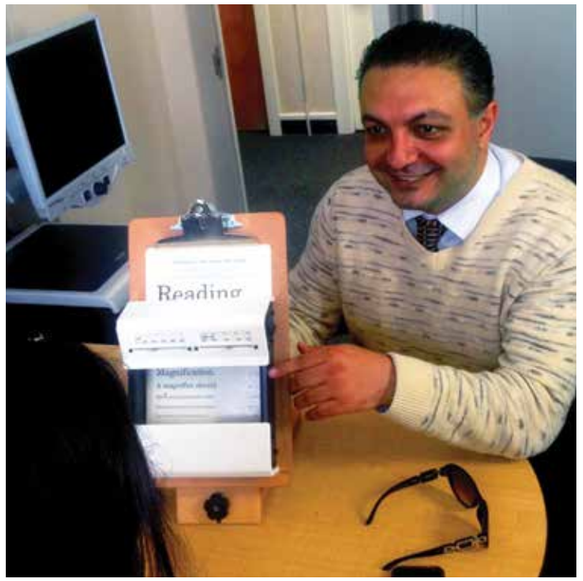
PURPOSE

Individuals with low vision often complain of reading difficulties and localized lighting has been shown to enhance reading function.[1] Lighting preference may depend on the type of ocular pathology, however this preference may not optimize functional reading for an individual. The LuxIQ™ (Jasper Ridge, Inc) has been promoted as a tool for prescribing task lighting. The purpose of this study was to investigate whether lighting impacts reading function objectively; and if the LuxIQ is a useful or necessary tool for assessing lighting function.



METHODS

Reading function of low vision participants (n=49) was assessed. Participants characteristics included: mean age 75 years (range 31 to 100 years). Visual acuity in the better seeing eye, (mean=20/155, range 20/20 to 20/731) and visual acuity in the worse seeing eye (mean=20/401, range 20/160 to NLP). Contrast Sensitivity (mean=11/30, range 0/30 to 30/30). MNRead Acuity Charts were used to measure reading function under four light settings: ambient room illumination (1040 lux), preferred setting and set points at 500 lux below and above the participants' preferred setting. Preferred setting was measured as the participants' subjective light preference when reading their preferred size print on the MNRead chart. Temperature was kept constant at 4500K, 575nm. Testing began under ambient illumination, followed by the preferred setting and the testing order of the objective light setting was randomized for each participant. A chin/forehead rest was used to ensure correct distance from eye to chart (40 cm). The LuxIQ was positioned above the MNRead chart and different charts were randomly selected and alternated for each lighting condition. Charts were placed under an opaque cover revealing only the sentence block which subjects were required to read. Critical print size (CPS) and maximum reading rates (MRR) were estimated by a best-fitting exponential fit to reading speed as a function of print size. Mean performance data for participants was computed, and 95% confidence intervals on the mean statistic were estimated with bootstrapping.

RESULTS

Participants utilized the full scale intensity settings on the LuxIQ. Marginal improvements were found for CPS (mean change=0.06 logMAR) and MRR (mean change=6 WPM) when using preferred light instead of ambient light, however this was not significant at the group level. For each individual, maximum reading performance could occur at any of the 4 light levels and only 26% performed best at their preferred light setting. When using the individuals' best setting instead of preferred setting, greater improvements were found for CPS (mean change =0.08 logMAR) and MRR (mean change=12 WPM). For the 24 individuals with improved CPS the mean improvement was 1.67 logMAR (range 0.1 - 0.3 logMAR) and for the 28 individuals with improved MRR the mean improvement was 21 WPM (range 10-60 WPM). While this is still not significant at the group level, some individuals could show as much as a two-fold improvement from their baseline reading function.

CONCLUSIONS

Practitioners commonly recommend the use of supplementary localized lighting to enhance near vision tasks. Task lighting can improve both reading acuity and reading speed for a given individual. Optimizing light improved CPS as well as MRR as compared to preferred setting, thus low vision participants were most likely to benefit from a specific lighting prescription versus simply increasing task lighting to a subjectively comfortable level. Our findings provide an evidence-based foundation for the development of an objective lighting prescription protocol for individuals with low vision.

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