

Symposium Paper

Colored Lenses to Improve Reading Comfort and Performance: Are Underlying Vision Problems being Missed?

Mitchell Scheiman, OD

Optometrists have raised concerns about the use of Irlen filters/lenses because of the striking similarity between the symptoms associated with accommodative, binocular and ocular motility disorders and the symptoms associated with the scotopic sensitivity syndrome described by Irlen. This article provides evidence demonstrating that Irlen filter candidates often have unidentified vision disorders, that optometric treatment alone can often eliminate these symptoms, that the Irlen evaluation does not adequately account for the presence of underlying vision problems, and that few research studies have adequately controlled for the presence of underlying vision problems. It is evident that many patients are receiving substandard eyecare resulting in undetected accommodative, binocular vision, and ocular motor disorders. Because these patients are still symptomatic they seek other remedies. This appears to be the population of people who are seeking help from colored filters. Although there is some evidence to indicate a potential role for the use of colored filters in the treatment of individuals with reading problems, it is incumbent on both researchers and clinicians to ensure that vision problems are adequately addressed before colored filters/lenses are used. **Key Words:** *colored filters, Irlen filters, scotopic sensitivity syndrome, binocular vision, accommodation, oculomotility disorders.*

Over the past 2 decades, the use of colored or tinted lenses to improve reading comfort and performance has become a prominent issue in both the popular media and professional literature. With increasing frequency,

clinicians are confronted with patients seeking advice about the value of colored lenses and possible treatment. Meares¹ and later Irlen² described a syndrome of visual symptoms and distortion that can be alleviated with colored filters. In addition, investigators claim that the required tint is idiosyncratic and needs to be highly specific.^{1,3-7} The term "scotopic sensitivity syndrome," was introduced by Irlen² and described as a perceptual dysfunction related to subjective difficulties

Correspondence regarding this article should be addressed to Mitchell Scheiman, OD, Pennsylvania College of Optometry, 1200 West Godfrey Ave, Philadelphia, PA 19141. E-mail: mscheiman@pco.edu

with light source, luminance, intensity, wavelength, and color contrast. More recently, Irlen has referred to the syndrome as the “Irlen Syndrome.”³ According to Irlen, individuals with this condition must use more effort and energy when reading because they are inefficient readers who see the printed page differently from the good reader. The difficulties they experience may lead to fatigue, discomfort, and inability to sustain attention for sufficient periods of time, sensitivity to light, eyestrain, difficulty focusing, unstable appearance of the print, words moving on the page, and words appearing washed out.³

Irlen³ claims that approximately 50% of the reading disability and dyslexic populations have this syndrome and that this is a key factor interfering with the reading process in these individuals. She suggests that close to 90% of individuals with this disorder can be successfully treated using appropriately tinted lenses, called “Irlen Filters/Lenses.” The objective of this treatment procedure is both to eliminate the discomfort associated with reading and to improve reading performance. Irlen³ also suggests that Irlen syndrome is a distinct entity that cannot be identified through standardized educational and psychological evaluations, vision examinations, medical checkups, or other standardized diagnostic tests.

Optometrists and ophthalmologists⁸⁻¹⁵ have raised a number of concerns about Irlen’s theories and methods. The first issue is the striking similarity between the symptoms that Irlen suggests are associated with scotopic sensitivity syndrome and the symptoms associated with accommodative, binocular vision, and ocular motility disorders. Specifically, the following symptoms have been reported to be associated with both scotopic sensitivity syndrome¹⁶ and the vision problems^{12,17} listed above: headaches, eyestrain, excessive blinking, excessive rubbing of the eyes, squinting, intermittent blur, occasional double vision, movement of words on a page, frequent loss of place, skipping lines, inability to sustain and concentrate, and rereading the same lines unintentionally. Could subjects diagnosed as having “scotopic sensitivity syndrome” simply have refractive, accommodative, binocular vision, or oculomotility disorder that has not been properly diagnosed?

This article is designed to explore the following issues:

1. Do Irlen filter candidates simply have unidentified vision disorders?
2. What is the effect of optometric intervention on symptoms of candidates for Irlen Lenses?
3. Does the current Irlen evaluation adequately account for the presence of underlying vision problems?
4. Have research studies on the use of colored filters adequately ruled out the presence of vision problems?

Do Irlen Filter Candidates Simply Have Unidentified Vision Disorders?

Scheiman, Blaskey, Ciner, *et al.*^{12,18} investigated this specific issue and reported that 95% of subjects (N = 39) identified as good candidates for Irlen filters had significant, readily identifiable vision anomalies. Fifty-seven percent of the subjects had binocular vision problems, 34% had accommodative problems, 26% had ocular motor dysfunction, and 29% had miscellaneous problems such as uncorrected or improperly corrected refractive errors, and uncorrected presbyopia. Lopez, Yolton, Kohl, *et al.*¹³ also investigated this issue. They found a high percentage of patients requiring colored filters were vision therapy candidates.

It is important to stress that Irlen advocates specifically claim that scotopic sensitivity syndrome is an entity which is distinct from vision problems that could be identified in an optometric evaluation. The Irlen brochure implies that each client first receives a complete vision examination and that vision problems are treated prior to Irlen diagnostic testing. The study by Scheiman, Blaskey, Ciner, *et al.*¹² addresses this issue. They found that 57% of their subjects either had periodic vision care or at least 1 eye examination within a year of the study. Of these subjects, 90% had significant uncorrected vision problems.

It is apparent that simply recommending an eye examination is insufficient to rule out accommodative, binocular vision, or ocular motility disorders; it is also necessary that appropriate testing be performed to detect the underlying vision disorders. This suggests

that the quality of eye care that is being provided is less than optimal. The “syndrome” discovered by Irlen, may simply be the discovery of a large segment of the population that is receiving inadequate vision care. Eye care professionals are apparently not incorporating accommodative, binocular, and ocular motility testing in routine evaluations, even when patients present with symptoms characteristic of disorders in these areas. Any non-eye care professional would reasonably assume that a negative result from previous eye examination means the absence of any significant vision problem. Irlen’s naming of the complex of signs and symptoms “scotopic sensitivity syndrome” or Irlen syndrome is understandable. However, another possible name to more aptly describe these patients would be “Comprehensive Eye Examination Deprivation Syndrome” (CEEDS). There appears to be a large population of individuals who are receiving substandard vision care. After an eye doctor informs them that their eyes are fine, they naturally seek care from other individuals and may subsequently be mistakenly identified with “Irlen syndrome.”

It is, therefore, apparent that there is a large population with unmet vision needs that have turned to the Irlen treatment approach for help that they failed to receive from eye care professionals.

What Is the Effect of Optometric Intervention on Symptoms of Candidates for Irlen Lenses?

Only the study by Blaskey, Scheiman, Parisi, *et al.* has addressed this issue.¹⁸ They performed a randomized clinical trial to compare the effectiveness of Irlen filters vs optometric intervention for improving the symptoms of Irlen lens candidates. Subjects were randomized into an Irlen treatment group, an optometric treatment group, and a control group (no treatment). Patients randomized into the optometric treatment group were treated with lenses and/or vision therapy and showed significant improvement in comfort. Before optometric intervention all subjects would have been considered candidates for Irlen lenses. After optometric treatment, the Irlen test scores dropped to a point at which they would not have been considered to be candidates for Irlen lenses. Thus, optometric intervention

alone was an effective method of reducing the discomfort reported by these subjects. This suggests that scotopic sensitivity syndrome may not be a distinct syndrome and that many individuals identified as candidates for Irlen lenses have significant, undetected vision disorders requiring treatment.

Does the Current Irlen Evaluation Not Adequately Account for the Presence of Underlying Vision Problems?

The Irlen evaluation consists of 2 parts. Part 1 is a screening to determine if the patient has scotopic sensitivity syndrome and if colored overlays are beneficial. If colored overlays are beneficial, these are prescribed and used for several weeks. If the patient reports that the overlays have been helpful, Part 2 of the Irlen Evaluation is scheduled and involves an evaluation to determine the appropriate tint to incorporate into eyeglasses. This process is similar to the subjective evaluation used by optometrists during the subjective refraction. This entire sequence of testing, however, is based on the basic assumption that the patient has already had a comprehensive eye examination and vision problems have been ruled out as a basis for any remaining symptoms experienced by the patient.

In “Reading by the Colors,”³ Irlen states: “Individuals interested in being screened for SSS should first see an optometrist or ophthalmologist and receive a complete visual examination.” Although it is a reasonable for a naïve observer to assume that any comprehensive eye examination will rule out any vision problem, Irlen and her associates, based on the research described earlier, should now be familiar with the notion that this is generally not the case.

Some authors do raise doubt about the routine eye examination. In “The Light Barrier” Stone¹⁹ states: “Typical vision evaluations test only for a few learning-related visual skills (distance visual acuity, stereo vision, and muscle balance), leaving most visual skill deficiencies undiagnosed.” However, this author does not go far enough to alert the reader to inquire about the doctor’s credentials and philosophy before scheduling the examination. Wilkins who is a strong advocate of the use of tinted lenses to improve reading comfort and performance²⁰ states: “It is therefore essential

that anyone who experiences the symptoms listed above or has difficulty reading obtains an examination from an optometrist. If they recommend eye exercises, these should be taken seriously.” He goes on to stress that it is important to ask the optometrist whether they will do certain tests before booking an appointment. The recommended tests are Mallet fixation disparity, fusional reserves at near, and accommodative lag. Although the use of these tests may be an improvement over the testing battery used by most optometrists or ophthalmologists, it is certainly not sufficient to rule out binocular vision, accommodative, and ocular motor disorders.

Based on this information it is clear, that as currently designed, the Irlen evaluation does not adequately rule out the presence on an underlying vision problem.

Have the Research Studies on the Use of Colored Filters Adequately Ruled Out the Presence of Vision Problems?

From an optometric perspective, a problem with almost all research to date has *been* a lack of attention to underlying vision disorders. Blaskey, Scheiman, Parisi, *et al.*¹⁸ completed a study of Irlen filters that did include a comprehensive assessment of vision as part of the experimental design. As reported above, 95% of subjects (N = 39) identified as good candidates for Irlen filters had significant, readily identifiable vision anomalies. In most studies,^{4,21-26} the only effort to ensure the absence of underlying vision problems has been requiring subjects to have an eye examination before entering the study. Other studies have made an attempt to screen subjects for vision problems prior to enrollment in the study. However, all of these studies have failed to adequately screen for binocular vision, accommodative, and ocular motor anomalies.^{5,27-31} They have failed to include tests such as accommodative facility testing, near point retinoscopy, and eye movement testing such as the Developmental Eye Movement Test, the NSUCO Oculomotor Test, or the Visagraph.

Thus, with the exception of 3 studies,^{12,13,18} investigators have failed to adequately ruled out the presence of vision problems in the design of their research on colored filters.

SUMMARY

The only research studies that have controlled for the presence of vision anomalies have demonstrated that a large percentage of patients that believe they would benefit from Irlen filters actually have significant undetected and uncorrected vision disorders. Another study¹⁸ showed that once treated with appropriate lenses and vision therapy they become comfortable and their attention, concentration, and sustaining ability improved when reading. Advocates of tinted glasses have made a critical error in suggesting that they can rule out vision disorders simply by assuring that all of their clients first have a vision examination. Irlen and other advocates of the use of colored filters and lenses to treat reading problems must begin to realize that all vision examinations are not identical and that to rule out a vision disorder they must make a referral to a professional who will perform appropriate testing. Testing must include a thorough assessment of refraction, accommodation (amplitude, facility, and response), binocular vision (eye alignment, fusional vergence, and vergence facility), and ocular motility (saccadic speed and accuracy).

It is also important to realize that there is some research to indicate that there are occasions in which the use of tinted lenses may help patients even after they have been treated with lenses and vision therapy. Researchers must continue to carefully investigate this phenomenon. However, in future studies it is imperative that subjects be adequately evaluated for underlying vision problems.

Finally, research on Irlen filters has demonstrated that many eye care professionals are not providing optimal care for their patients. It is clear that many patients with accommodative and binocular vision disorders are not being properly managed. This appears to be the population of people who are seeking help from Irlen filters.

REFERENCES

1. Meares O. Figure/ground, brightness contrast, and reading disabilities. *Visible Language* 1980;14:13-29.
2. Irlen H. Successful treatment of learning difficulties. In *91st Annual Convention of the American Psychological Association* August 1983, Anaheim, CA.
3. Irlen H. Reading by the colors: Overcoming dyslexia and

- other reading disabilities by the Irlen method. New York: Avery, 1991.
4. Robinson GL, Foreman PJ. Scotopic sensitivity/Irlen syndrome and the use of coloured filters: A long-term placebo controlled and masked study of reading achievement and perception of ability. *Percept Motor Skills* 1999;89:83–113.
 5. Wilkins AJ, *et al.* Double-masked placebo-controlled trial of precision spectral filters in children who use coloured overlays. *Ophthalm Physiol Opt* 1994;14:365–370.
 6. Evans BJ, *et al.* Effect of pattern glare and colored overlays on a simulated-reading task in dyslexics and normal readers. *Optom Vis Sci* 1994;71(10):619–628.
 7. Evans BJ, *et al.* A review of the management of 323 consecutive patients seen in a specific learning difficulties clinic. *Ophthalm Physiol Opt* 1999;19(6):454–466.
 8. Stanley G. Coloured filters and dyslexia. *Aust J Remedial Ed* 1987;19:8–9.
 9. Rosner J, Rosner J. The Irlen treatment: A review of the literature. *Optician* 1987;194:26–33.
 10. Rosner J. Another cure for dyslexia? *J Am Optom Assoc* 1988;59:832–833.
 11. Howell E, Stanley G. Colour and learning disability. *J Clin Exp Optom* 1988;71:66–71.
 12. Scheiman M, *et al.* Vision characteristics of individuals identified as Irlen Filter candidates. *J Am Optom Assoc* 1990;61:600–605.
 13. Lopez R, *et al.* Comparison of Irlen scotopic sensitivity syndrome test results to academic and visual performance data. *J Am Optom Assoc* 1994;65(10):705–714.
 14. Hoyt CS. Irlen lenses and reading difficulties. *J Learning Dis* 1990;23(10):624–626.
 15. Helveston EM. Scotopic sensitivity syndrome. *Arch Ophthalmol* 1990;108:1232–1233.
 16. Irlen H, Lass M. Improving reading problems due to symptoms of scotopic sensitivity using Irlen lenses and overlays. *Education* 1989;109:413–417.
 17. Hoffman LG, Rouse MW. Referral recommendations for binocular and/or developmental perceptual deficiencies. *J Am Optom Assoc* 1980;51:119–125.
 18. Blaskey P, *et al.* The effectiveness of Irlen filters for improving reading performance: A pilot study. *J Learning Dis* 1990;23(10):604–612.
 19. Stone R. *The light barrier*. New York: St. Martin's Press, 2002.
 20. Wilkins AJ. Reading through colour: How coloured filters can reduce reading difficulty, eye strain, and headaches. West Sussex, UK: John Wiley & Sons, 2003.
 21. Robinson GL, Miles J. The use of overlays to improve visual processing—A preliminary report. *Except Child* 1987;34:65–69.
 22. Robinson GL, Conway RNF. Irlen lenses and adults: a small-scale study of reading speed, accuracy, comprehension and self-image. *Aust J Learn Disabil* 2000;5:4–12.
 23. Whiting PR. Improvement in reading and other skills using Irlen coloured lenses. *Aust J Remed Educ* 1988;20:13–15.
 24. Clayton P. The Irlen lens: scotopic sensitivity. *Optician* 1987;194:22–25.
 25. Robinson GL, Conway NF. The effects of Irlen colored lenses on students' specific reading skills and their perception of ability: a 12-month validity study. *J Learning Dis* 1990;23:621–626.
 26. O'Connor PD, Sofo F, Kendal L. Reading disabilities and the effects of colored filters. *J Learning Dis* 1990;23:597–603.
 27. Evans BJ, *et al.* Optometric correlates of Meares-Irlen syndrome: a matched group study. *Ophthalm Physiol Opt* 1995;15(5):481–487.
 28. Evans BJ, *et al.* A preliminary investigation into the aetiology of Meares-Irlen syndrome. *Ophthalm Physiol Opt* 1996;16(286–296).
 29. Scott L, *et al.* Coloured overlays in schools: orthoptic and optometric findings. *Ophthalm Physiol Opt* 2002;22:156–165.
 30. Evans BJ, Joseph F. The effect of coloured filters on the rate of reading in an adult student population. *Ophthalm Physiol Opt* 2002;22:535–545.
 31. Spafford CS, *et al.* Contrast sensitivity differences between proficient and disabled readers using colored lenses. *J Learning Dis* 1995;28(4):240–252.