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75	Editorial
76	Editorial
85	Editorial
95	Editorial
103	Editorial
110	Editorial

REVIEW

A systematic review of controlled trials on visual stress using Intuitive Overlays or the Intuitive Colorimeter



Bruce J.W. Evans^{a,*}, Peter M. Allen^b

^a Institute of Optometry, London, UK

^b Department of Vision and Hearing Sciences and Vision and Eye Research Unit, Anglia Ruskin University, Cambridge, UK

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Review

Abstract Claims that coloured filters aid reading date back 200 years and remain controversial. Some claims, for example, that more than 10% of the general population and 50% of people with dyslexia would benefit from coloured filters lack sound evidence and face validity. Publications with such claims typically cite research using methods that have not been described in the scientific literature and lack a sound aetiological framework.

Notwithstanding these criticisms, some researchers have used more rigorous selection criteria and methods of prescribing coloured filters that were developed at a UK Medical Research Council unit and which have been fully described in the scientific literature. We review this research and disconfirm many of the more extreme claims surrounding this topic. This literature indicates that a minority subset of dyslexics (circa 20%) may have a condition described as visual stress which most likely results from a hyperexcitability of the visual cortex. Visual stress is characterised by symptoms of visual perceptual distortions, headaches, and eyestrain when viewing repetitive patterns, including lines of text. This review indicates that visual stress is distinct from, although sometimes co-occurs with, dyslexia. Individually prescribed coloured filters have been shown to improve reading performance in people with visual stress, but are unlikely to influence the phonological and memory deficits associated with dyslexia and therefore are not a treatment for dyslexia.

This review concludes that larger and rigorous randomised controlled trials of interventions for visual stress are required. Improvements in the diagnosis of the condition are also a priority.

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Abbreviations: IO, intuitive overlay; IC, intuitive colorimeter; PGT, pattern glare test; PRVS, pattern related visual stress; RCT, randomised controlled trial; VS, visual stress; WRRT, Wilkins Rate of Reading Test.

* Corresponding author at: Institute of Optometry, 56-62 Newington Causeway, London SE1 6DS, UK.

E-mail address: admin@ioo.org.uk (B.J.W. Evans).

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PALABRAS CLAVE

Estrés visual;
Filtros coloreados;
Colorímetro;
Revisión

Revisión sistemática de los ensayos controlados sobre estrés visual utilizando filtros intuitivos o colorímetros

Resumen Las aseveraciones acerca de que los filtros coloreados ayudan a la lectura se remontan 200 años atrás, y siguen siendo controvertidas. Por ejemplo, algunas afirmaciones relativas a que el 10% de la población general y el 50% de las personas disléxicas podrían beneficiarse de los filtros coloreados carecen de evidencia y de validez firmes. Las publicaciones que incluyen dichas afirmaciones citan, normalmente, investigaciones que hacen uso de métodos no descritos en la literatura científica y que carecen de marcos etiológicos sólidos.

A pesar de estas críticas, algunos investigadores han utilizado unos criterios y métodos de selección más rigurosos para la prescripción de filtros coloreados, desarrollados en una unidad del Medical Research Council del Reino Unido y que se han descrito cuidadosamente en la literatura científica. Revisamos todas estas investigaciones que desmienten muchas de las aseveraciones más extremas que rodean a esta cuestión. Esta literatura científica consistente indica que un subgrupo minoritario de disléxicos (de alrededor del 20%) puede padecer una afección médica descrita como estrés visual, que deriva muy probablemente de la hiperexcitabilidad de la corteza visual. El estrés visual se caracteriza por síntomas de distorsión de la percepción visual, cefaleas, y fatiga visual al visualizar patrones repetitivos, incluyendo las líneas de texto. Esta revisión indica que el estrés visual es diferente a la dislexia, aunque a veces coexisten ambas situaciones. Se ha demostrado que los filtros coloreados individualmente prescritos mejoran el desempeño lector en personas con estrés visual, pero es improbable que mejoren los déficits fonológicos y de memoria que se asocian a la dislexia, por lo que no constituyen un tratamiento para la misma.

Esta revisión concluye que se precisan más ensayos controlados y aleatorizados sobre intervenciones para el estrés visual. También son prioritarias las mejoras diagnósticas de dicha afección.

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Introduction

Claims that coloured filters ease eyestrain when reading originate from the 1780s,¹ and in 1964 Critchley described a dyslexic child who could only read on coloured paper.² Meares described a cluster of symptoms³ of perceptual distortion when reading and Irlen claimed the distortions were common and were reduced by her individually prescribed coloured filters⁴; claims that remain controversial.^{5,6} Previous reviews of this condition, often now called visual stress (VS), have reached discrepant conclusions.^{5,7} VS is characterised by symptoms of asthenopia and visual perceptual distortions when observing striped patterns, including lines of text.⁸ This field lacks large randomised controlled trials of the type that would be required for the validation of new drugs. This situation is somewhat analogous to that faced recently by authors reviewing treatments for intermittent exotropia⁹: a recent Cochrane review (on intermittent exotropia) was unhelpful because it had only found one appropriate study. These authors dealt with this dilemma in a pragmatic way, by carrying out a review of the best available evidence.⁹ The present authors have adopted a similar pragmatic approach to review the best available evidence for treatments of visual stress.

The initial approach for the treatment of visual stress, developed by Irlen, has been criticised because the system has not been fully described in the scientific literature,¹⁰ does not systematically sample colour space,^{11,12} and is not

typically administered by eyecare professionals. A newer system using "Intuitive overlays" (IO), the "Intuitive colorimeter" (IC), and Cerium Precision Tinted Lenses was developed by Wilkins at the UK Medical Research Council (MRC) Applied Psychology Unit. This system is fully described in the scientific literature,^{11,13,14} systematically and efficiently samples colour space,^{11,13} and has been shown to have the properties required for an appropriate method.¹⁴⁻¹⁷ This system is used by eyecare professionals which is important clinically to ensure that symptoms due to ophthalmic conditions are alleviated before colour is used.^{18,19} For these reasons, this paper reviews evidence from research using the Wilkins (MRC) system.

The condition that is purportedly helped by coloured filters has been given various names,²⁰ most recently visual stress²¹ or pattern related visual stress (PRVS).²² Visual stress has other meanings,²³⁻²⁵ but as noted below in the discussion most studies in this field to date are likely to have included a heterogeneous sample. PRVS relates the condition to the likely aetiology²⁶ and PRVS may be the most appropriate term for studies that include a pattern glare test, although at present this is only a minority of studies. For the present review the widely used term visual stress will be used. Intuitive overlays¹¹ are sheets of coloured plastic placed on the page and in this review Precision Tinted Lenses describes coloured lenses prescribed with the IC.¹³ The term coloured filters is used generically to describe intuitive overlays and Precision Tinted Lenses prescribed with the IC.

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