



# BCOVS 2024

12<sup>th</sup> and 13<sup>th</sup> September 2024

## **Abstract booklet**

(Listed alphabetically by first author last name)



**CITY**  
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— EST 1894 —

# Welcome to BCOVS 2024!

A very warm welcome to City, University of London and to the British Congress of Optometry and Vision Science (BCOVS) 2024. We are delighted to be hosting BCOVS at City this year and hope you will enjoy the programme; there is a wide variety of topics represented by both papers and posters, demonstrating the richness of the current research landscape in Optometry and Vision Science. For many of you, this will be your first time presenting, and we are excited to provide a platform for you to share your research and insights.

This year, we are thrilled to host approximately 85 delegates from 12 different institutions. We extend a special thank you to our Keynote Speakers, Professor Alicja Rudnicka, Professor Christopher Owen, and Professor Ron Douglas, whose talks promise to be highlights of the conference.

We encourage you to engage with the conference on social media using our Twitter page [@BCOVS2024](#) and the hashtag [#BCOVS2024](#). We will be taking photos during the conference; if you prefer not to be included in social media or news coverage, please email [mehal.rathore@city.ac.uk](mailto:mehal.rathore@city.ac.uk).

Don't miss the Drinks Reception from 17:10-18:10 on Day 1 (12th September). Following this, the conference dinner will be held at Gallipoli on the historic Upper Street in Islington at 7pm. Charles Dickens once described Upper Street as "amongst the noisiest and most disagreeable thoroughfares in London". We like to think he was just having a bad day! The conference dinner requires separate booking, so please speak to one of the organising committee members if you would like to attend but have not yet registered.

If you require any assistance, members of the organising committee can be identified by the holographic sticker on their lanyard and their City, University of London "**Happy to Help**" badges. Please feel free to approach them with any questions or concerns.

We are immensely grateful to our sponsors, whose generous support has made much of this conference possible. Please refer to the list of sponsors overleaf and join us in thanking them. I would also like to extend a heartfelt thanks to the organising committee and entire Optometry team at City for their hard work and dedication in making BCOVS 2024 a success. All of their efforts have been instrumental in bringing this event to life.

We hope you enjoy your stay in London and BCOVS 2024!

Deanna Taylor

On behalf of the BCOVS 2024 Organising Committee:

Sajni Bohra, Deborah Bott, Riccardo Cheloni, Jamie Enoch,  
Liz Frost, Aiman Hafeez, Peter Jones, Mehal Rathore,  
Peter Reddingius, Paul Roberts

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# Spatiotemporal processing in dyslexia

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*Cardiff University*

**Purpose:** An investigation of fine spatial judgements perturbed by a brief temporal gap in one case, and motion on the other, in people with dyslexia to understand whether people with dyslexia's (known) impaired temporal perception impacts on their ability to make fine spatial judgements which is crucial for reading.

**Methods:** Thirty adult participants were recruited in this study. They were equally separated between the two groups and were demographically comparable. A temporal order judgment task of two stimuli rapidly presented was performed to measure the temporal acuity in addition to a bisection spatial task which consists of two flanking bars and a bisector which flashes in between to measure spatial acuity. The spatial task had three different test modes: static, jitter (where stimuli jitter around in Brownian motion), and a static with a temporal gap between flankers and the bisector. Also, to characterise dyslexia, reading ability tests and an intelligence test were performed in addition to visual stress symptoms tests.

**Results:** In agreement with the literature, a distinguished temporal processing deficit in people with dyslexia was observed. Spatially, and despite dyslexics being less precise in every test mode, the difference between groups was not significant. Similarly, thresholds were slightly/insignificantly higher in dyslexia group. The temporal deficit in dyslexia mildly correlated with reading ability performance and visual stress symptoms.

**Conclusion:** People with dyslexia have poorer spatiotemporal processing compared to controls. The temporal deficit in dyslexia correlates with both reading skills and stress symptoms which warrants further investigation.

# Impact of visual degradation on hazard perception performance in younger and older drivers

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**Purpose:** For safe driving, drivers must be able to detect and respond effectively to driving hazards. This study examined how visual degradation affects hazard detection while undertaking the UK Hazard Perception Test (HPT) driving simulation.

**Method:** Fifty-nine drivers (n=31 younger:24.1±5.5 years, n=28 older:52.8±8.7 years) with binocular visual acuity <0.00LogMAR completed ten HPTs with and without induced visual degradation, while their HPT performance (%) was measured in MATLAB programme. The visual degradation conditions included (i) optical blur (+2.00D spherical lens), (ii) media opacity (LEE Fog 5 filter), and (iii) glare (two glare sources simulating vehicle headlights); applied individually and in combination. To minimise memorisation effects, HPT videos were randomised, and performance with the induced visual degradations was assessed two weeks after baseline measures (without visual degradation).

**Results:** There was no significant difference in baseline HPT scores between younger and older drivers (65.1% vs 62.8%, p=0.29). In optical blur condition, older drivers' HPT performance significantly reduced compared to younger drivers (51.5% vs 63.6%, p=0.02), and particularly in adverse weather conditions (17.9% difference, p=0.01). However, when induced optical blur, media opacity, and glare were combined, younger drivers' mean HPT performance (26.6%) significantly decreased compared to older drivers (37.8%) (p=0.04).

**Conclusion:** Older drivers exhibited poorer HPT performance with optical blur, which worsened in adverse weather driving conditions, while younger drivers showed decreased performance only when all forms of visual degradation were combined. Correction/treatment of any form of visual condition among drivers, particularly older individuals, is crucial for the appropriate detection of hazards.

# Intra-session repeatability of automated choroidal thickness measurements from the Topcon DRI Triton SS-OCT in young adults

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**Purpose:** Prior research suggests that automated choroidal segmentation with Optical Coherence Tomography (OCT) is less repeatable in Asians (1), which may be a potential healthcare inequality concern. The purpose of this study is to investigate factors affecting intra-session repeatability of automated choroidal segmentation in a largely Asian cohort, including axial length (AL) and ethnicity.

**Methods:** 7.0 x 7.0mm macular OCT images were taken of 162 participants aged 18- 25 years, with 91% self-identifying as Asian. The automated early treatment diabetic retinopathy study (ETDRS) grid was used to obtain area average choroidal thickness values (2). Intra-class correlation (ICC), paired t-tests, and Bland-Altman analysis were performed to evaluate repeatability (3). Measurements of AL were taken using an IOLmaster, and were correlated to the choroidal thickness repeatability using Pearson's correlation.

**Results:** All nine regions of the ETDRS grid had high ICC between the two measures ( $ICC \geq 0.98$ ). T-test results for all participants showed no significant difference between the first and second measures ( $P > 0.05$  for all). In Asian participants, the inner nasal region of the right macula showed significant variability between the two measures ( $1.77 \pm 8.69 \mu\text{m}$ ,  $P = 0.016$ ). Only the outer temporal region showed a negative correlation between AL and repeatability ( $r = -0.345$ ;  $P < .001$ , all other areas  $P > 0.05$ ).

**Conclusion:** The Triton SS-OCT shows high repeatability in measuring choroidal thickness. However specific EDTRS areas in Asians show poorer repeatability, as indicated in previous research (1). Further analysis evaluating retinal pigmentation and its effect on repeatability is required to investigate this relationship.

# Short term-effects of Repeated Low-level Red Light Therapy for myopia management on colour vision perception and choroidal thickness.

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**Purpose:** To investigate if short-term use of Repeated Low-Level Red Light Therapy (RLRL) results in changes in colour vision perception or choroidal thickness (1, 2), and capture a UK populations' feedback to using RLRL.

**Methods:** Participants aged between 8-23 years underwent a visual acuity assessment, macular optical coherence tomography (OCT) and a colour vision assessment using the colour assessment diagnosis (CAD) test to provide baseline measures. Participants then attended three visits where they received a treatment of RLRL, and performed the CAD test immediately after, and again after a 5-minute interval. OCT imaging was repeated at the end of the third visit. Participants were also asked to provide feedback on their experience with RLRL.

**Results:** Significant reduction in colour perception sensitivity was found immediately after exposure to RLRL ( $P < 0.01$  for all three visits), which recovered after 5 minutes. No significant change to colour perception was observed after the 3 visits compared to baseline ( $P > 0.05$ ). There was no significant difference in choroidal thickness in the left eye, but the right eye showed macular choroidal thinning  $5 \pm 8.6 \mu\text{m}$  95% CI ( $P < 0.018$ ). Participant results indicated that they'd likely use RLRL for myopia management if necessary (median score = 4 out of 5).

**Conclusion:** RLRL seems to only influence colour vision perception immediately following treatment and returns to normal within 5 minutes. Findings suggest that short-term use of RLRL does not induce choroidal thickening, supporting previous results(3). Participant feedback suggests that UK children and young adults would consider using RLRL for myopia management.

# Visual performance in prediabetes: use of functional assessment in the early detection and monitoring of diabetes.

Sajni Bohra, Marisa Rodriguez-Carmona, John. L Barbur

*City, University of London*

**Purpose:** To investigate whether changes in spatial vision, chromatic, and rapid flicker sensitivity are early biomarkers for diabetes.

**Methods:** Participants included controls and prediabetics (HbA1c 42-47mmol/mol). Visual acuity (VA) and functional contrast sensitivity (FCS) were measured using Acuity-Plus test with positive and negative contrast optotypes. Best-corrected VA was assessed using ETDRS chart. Cone and rod-enhanced flicker modulation thresholds (FMTs) were evaluated with Flicker-Plus test centrally and in four parafoveal locations. Red/green (RG) and yellow/blue (YB) colour thresholds were measured using Colour Assessment and Diagnosis (CAD) test.

**Results:** Prediabetics showed higher VA and FCS thresholds than controls, with significant differences in negative contrast. Prediabetics had ~10% and ~25% poorer VA in positive and negative contrast, respectively, compared to controls. with FCS thresholds ~8% higher (positive contrast) and ~28% higher (negative contrast). About 14% of prediabetics exceeded age-matched upper limits for FCS measured with negative contrast optotypes, than ~3% of controls. VA thresholds in prediabetics were significantly higher than ETDRS values. RG and YB thresholds, along with rod- and cone-mediated FMTs, were higher in the prediabetic group than controls. Abnormal RG (~19%) and YB (~38%) thresholds were found in prediabetics, compared to ~11% and ~24% of controls. HbA1c levels correlated positively with increasing VA, FCS, and chromatic thresholds.

**Conclusion:** Findings indicate that VA and FCS, particularly with negative contrast stimuli, along with chromatic and flicker sensitivity, are impaired in prediabetic individuals. This suggests that spatial vision, chromatic and FMTs could be valuable biomarkers for early diabetes detection, enabling timely interventions.

# Determinants of glaucoma medication adherence: An interview study with patients from the United Kingdom and India

Deborah Bott, Ahalya Subramanian, David Edgar, John Lawrenson,  
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*City, University of London*

**Purpose:** Adherence to long-term glaucoma medication is often poor, especially in low- and middle-income countries.<sup>1</sup> Suboptimal adherence can lead to sight loss.<sup>2</sup> Current interventions to improve adherence have limited success, lacking a robust theoretical underpinning.<sup>3</sup> Understanding what influences medication adherence can inform development of new strategies to improve adherence. This qualitative study aimed to identify and compare factors influencing glaucoma medication adherence in the United Kingdom (UK) and India, by applying the Theoretical Domains Framework (TDF) of behaviour change.<sup>4</sup>

**Methods:** Participants diagnosed with glaucoma, prescribed one or more IOP-lowering eyedrops, were purposively sampled. Semi-structured interviews were conducted, recorded, and transcribed. Data were organized via NVivo and analysed using the TDF to explore personal, sociocultural, and environmental factors influencing adherence. Interview transcripts were analysed using deductive and inductive thematic analyses.

**Results:** Twenty-four participants were interviewed (n=13 UK, n=11 India). Common barriers to adherence across both settings included lifestyle factors, healthcare system issues, difficulties obtaining medication, forgetfulness, and poor physical/visual ability. Facilitators included understanding the rationale for treatment, believing eyedrops are necessary to preserve vision, and developing routine/reminder strategies. UK participants had confidence in their own ability to persist with treatment and in developing skills for ordering ongoing medication supplies. In India, social influences and family dependence were more influential in facilitating adherence.

**Conclusion:** Glaucoma medication adherence is influenced by multiple factors, with both similarities and cultural and social differences between UK and India. Tailored interventions targeting these specific factors may improve adherence and help reduce preventable vision loss.

# Investigating the optimal perimetric stimulus to identify gradients in retinal ganglion cell density in healthy observers

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**Purpose:** To compare the utility of conventional Goldmann-sized perimetric stimuli modulating in luminance and a novel area-modulation stimulus (AMS) to identify retinal ganglion cell density (RGCD) gradients in healthy observers.

**Methods:** Contrast thresholds were measured for Goldmann III (GIII; 0.43 degrees, 200 ms) and V (GV; 1.72 degrees, 200 ms) stimuli at 3 and 10 degrees eccentricity in 80 healthy observers (median age 29 years, range: 18-85). Area thresholds were measured at the same locations using an area-modulated, fixed luminance stimulus (Delta I: 5.3cd/m<sup>2</sup>, 200 ms). Thresholds were expressed in common energy units. Co-localised estimates of RGCD were generated from OCT-derived RGC layer thickness<sup>1</sup> accounting for RGC displacement.<sup>2</sup> The ratio of differences in log energy thresholds (Delta E) and absolute log RGCD (Delta D) between test locations was calculated for observers, where a value closer to one indicated a linear relationship.

**Results:** Delta E (median, IQR) was largest for AMS (0.31, 0.20-0.46), compared to GIII (0.16, 0.04-0.23) and GV (0.07, 0.01-0.13) (Wilcoxon-Signed Rank tests, all  $p < 0.001$ ). Ratio values (median, IQR) were closest to one for AMS (0.53, 0.36-0.77), followed by GIII (0.30, 0.08-0.42), and furthest from one for GV (0.13, 0.01-0.23), these inter-stimuli differences being statistically significant (Friedman test,  $p < 0.001$ ). Post-hoc Wilcoxon-Signed Rank tests with Bonferroni correction showed statistically significant differences in ratio values between all stimulus pairs (all  $p < 0.001$ ).

**Conclusion:** Perimetric stimuli modulating in area to probe spatial summation changes are more sensitive to physiological RGCD gradients with eccentricity in healthy observers compared to perimetric stimuli modulating in luminance.

# Optometrists perceived barriers and the need for further training to support patients with vision impairment in England

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**Purpose:** Patients with vision impairment have reported a lack of clarity around the Certification of Vision Impairment and the registration process. Previous research has found optometrists do not always engage with patients to advise and signpost them.

**Methods:** An online questionnaire investigated optometrists knowledge of the registration process and barriers they might have faced when providing support to patients with vision impairment. The survey also ascertained any unmet training needs on low vision and whether optometrists would be happy to certify patients. Open ended questions were analysed using inductive content analysis.

**Results:** A total of 169 questionnaires were completed by UK optometrists between October 2023 and January 2024. Eighty-two percent of optometrists were aware of the Certification of Vision Impairment (CVI) process, whereas only 39% were aware of the Referral of Vision Impairment (RVI). Sixty percent of optometrists were aware of the services available after CVI and RVI and 94% would be happy to certify patients. Optometrists indicated the need for further awareness on the registration process, low vision services available locally, and advice on how their patients may access mental health support if/when needed.

**Conclusions:** Confusion around the certification and registration process needs to be addressed, along with better awareness and knowledge of local accessible support. Optometrists would benefit from formal CPD training with input from ECLOS, low vision practitioners and the Hospital Eye Service. With appropriate remuneration optometrists reported positively with regards to upskilling and extending their scope of practice to ensure the best care for patients.

# Seasonal differences in axial elongation in a UK cohort of young adults.

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**Purpose:** The purpose of this study was to monitor axial length within a student cohort of young adults and estimate the prevalence and rate of axial elongation over 18 months.

**Methods:** A total of 118 higher education students aged 18-25 years completed a prospective, longitudinal cohort study. Axial length measurements were taken at 0, 6, 12, and 18 months. At 18 months, those with axial length increase greater than the intersession repeatability of the biometer ( $>+0.04\text{mm}$ , IOL-Master, Zeiss: Germany) were labelled 'potential progressors', while those with  $\leq+0.04\text{mm}$  change were labelled 'non-progressors'. [1] Repeated measures were compared with a Friedman ANOVA and post-hoc pairwise analysis.

**Results:** Median baseline AL was 23.91mm (interquartile range; IQR, 23.28-24.62mm). Over 18 months, median axial elongation was 0.03mm (IQR, 0.00-0.08mm), with 31.4% of participants found to be potential progressors. For potential progressors, axial elongation was found to be significantly different across repeated measures ( $\chi^2(2) = 33.238, P < 0.001$ ), with the 0-6- and 12-18-months periods (October to March) showing significantly higher axial elongation than in the 6-12-month period (April to September) after Bonferroni adjustment (both  $P < 0.001$ ). Non-progressors did not exhibit any difference in elongation between time periods ( $\chi^2(2) = 0.950, P = 0.622$ ).

**Conclusion:** Nearly a third of young adults in higher education exhibit axial elongation. The rate of axial elongation is comparable to other cohorts of 18-25-year-olds. [2] Prior studies in children have reported greater axial elongation over the winter period, and the results presented here suggest this pattern continues into early adulthood. [3]

# What do practitioners perceive to be the main barriers to effective lifestyle advice provision for patients with Age related Macular Degeneration (AMD)?

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**Purpose:** Global guidelines recommend practitioners advise patients with Age-related Macular Degeneration (AMD) to make lifestyle changes to reduce the risk of disease progression. However, research shows that not all practitioners are providing this advice and there are barriers that impact advice effectiveness. The aims of this study were to investigate the experiences and perceptions of practitioners about the barriers to effective lifestyle advice provision.

**Methods:** Practitioners from ten hospitals and 24 optometry practices in England were recruited to complete a questionnaire. The questions focused on the practitioners experiences with advice provision and their perceptions on how it can be improved. Chi-squared and Mann-Whitney U tests were used to analyse quantitative data and the qualitative data was thematically analysed.

**Results:** Fifty-four practitioners were included in the study. Most participants were nurses (n=22; 40.7%) practicing primarily in hospital eye departments (n=44; 81.5%). Most participants reported providing lifestyle modification advice to patients (n=47; 87%). However, this was not associated with profession ( $\chi^2(6) = 11.69$  p=0.07), years practicing ( $\chi^2(4) = 4.03$  p=0.40) or type of practice ( $\chi^2(10) = 5.37$  p=0.87). Advice was most commonly regarding 'diet and exercise'. A 'lack of understanding' was the most common theme as a barrier to effective lifestyle advice provision and 'more written resources' (n=32; 59.3%) were required.

**Conclusion:** Lifestyle modification advice is being provided to patients with AMD, but there are several inconsistencies regarding the advice being provided and how it is given. Written materials require further research to increase the efficacy of lifestyle advice.

# How much retinal functional and structural loss results in an unmeasurable ERG?

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**Purpose:** In practice patients have unmeasurable full field ERGs even when they have other forms of visual function that are still measurable. In this project, we aimed to establish a relationship between the degree of retinal degeneration that occurs and when the electroretinogram (ERG) wave is no longer measurable.

**Methods:** ERG test data under multiple luminances was collected retrospectively from clinical assessments undertaken from January 2012 – November 2022 under ethics granted by the HRA (reference o8/Ho302/96). OCT images were collected from patients.

Retinal function was assessed using wide field visual field assessment using Goldmann kinetic perimetry with multiple isopters. This was then quantified using volumetric assessment. Retinal structure was assessed using imaging with ocular coherence tomography (OCT).

The OCT and Goldmann visual field data were then correlated with the ERG a- and b-wave amplitudes via logistic regression for lower luminance and linear regression for higher luminances to establish whether there was a cutoff point at which the ERG became unmeasurable.

**Results:** Logistic and linear regression analyses showed no significant correlations between retinal thickness, GVF volume, and ERG responses across luminance levels for both eyes ( $P > 0.05$ ) with wide confidence intervals in most cases. No clear cutoff for unmeasurable ERG results could be found.

**Conclusion:** A definitive relationship between retinal structure or function and the point at which the ERG becomes unmeasurable was not found due to inconsistent correlation between variables. However, an unmeasurable ERG should not be interpreted as the eye having no visual function remaining.

# Parents and Carers Perspectives on the SeeAbility NHS Special Schools Eye Care Service

Lisa Donaldson,<sup>1,2</sup> Malvi Patel,<sup>1</sup> Donna O'Brien,<sup>1</sup> Marek Karas<sup>1,3</sup>

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3: Cardiff University

**Purpose:** Children with learning disabilities face significantly higher risks of vision problems compared to the general population. Despite this, studies reveal that a large percentage of these children do not receive regular eye care. In 2017, Public Health England recommended a comprehensive in-school eye care model for special schools. This study explores the parental experience of this model.

**Methods:** SeeAbility delivers the NHS special schools eye care service in 31 schools and colleges in London. Parents and carers of children seen between April 2022 and March 2023 were surveyed using Microsoft Forms. The survey included demographic questions, Likert scale statements, and free text comments.

**Results:** Of 2186 questionnaires sent, 417 valid responses were received (19.2% response rate). High satisfaction levels were noted, with 96% of parents happy with the service and 98% willing to recommend it. Parents preferred school-based eye care (84.41%). Thematic analysis of comments highlighted the benefits of continuity of care, specialist dispensing, and clear communication regarding visual needs.

**Conclusion:** The survey evidences strong parental support for the in-school eye care service, citing convenience, reduced stress, and improved understanding of their children's vision as key benefits. The service's model, which includes specialist dispensing and regular follow-ups, significantly improves reported compliance with spectacle use, is highly valued by parents and carers and enhances understanding of children's vision needs. These positive parental experiences support the continued and expanded provision of in-school eye care services to address the significant unmet need in this population.

# Do adult myopes find Stellest myopia control lenses tolerable?

Mobashir Fatimah, Sara J McCullough, Lesley Doyle, Kathryn J Saunders

*Ulster University*

**Purpose:** To investigate the tolerability of Essilor's Stellest myopia control spectacle lenses in adult myopes and their impact on visual functions.

**Methods:** Habitual spectacle-wearing adult myopes were recruited. Visual acuity, stereopsis, ocular posture, accommodative amplitude and response were measured with habitual spectacles and following 2-weeks of Stellest wear. The tolerability of Stellest spectacle lenses was compared with habitual spectacle lenses using a questionnaire exploring compliance, comfort, associated symptoms, and adaptation.

**Results:** 17 adult myopes (aged 18–36 years; spherical equivalent: -0.50 to -6.50D) participated. Visual function measures did not differ significantly between Stellest and habitual lenses (all  $p \geq 0.27$ ). Participants wore Stellest on average 11 hours/day (range 6-16 hours) and took 2 days (range 1-5 days) on average to adapt. More participants rated habitual lens comfort as 'good' when climbing stairs (94% vs 47%,  $p=0.03$ ), driving (100% vs 44%,  $p=0.03$ ), and using a laptop (94% vs 53%,  $p=0.02$ ) compared to Stellest wear. General visual comfort and comfort when walking and using mobile phone was equivalent between modalities (all  $p > 0.08$ ). Participants more frequently reported peripheral blur (70% vs 59%,  $p < 0.001$ ) and need to move their head/frame to achieve clear vision (88% vs 29%,  $p=0.002$ ) with Stellest compared to habitual lenses. 77% of participants expressed willingness to wear Stellest if necessary to control myopia progression.

**Conclusion:** Visual functions were comparable with Stellest and habitual lens wear. Adults wearing Stellest lenses may experience peripheral blur and require more head movement to maintain good vision compared to standard lens wear.

# The Impact of COVID-19 on Low Vision support services – Service Providers' perspectives

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**Purpose:** People with low vision (LV) often require LV support services<sup>1</sup>. During COVID-19 most LV support services were initially suspended; many experienced continued disruption<sup>2</sup>. **Aim:-** investigate Service Providers' (SPs) experiences of, and views on, the pandemic's impact on services; future service provision; and steps to lessen negative impacts during a similar event. Mixed methods research, qualitative results presented.

**Methods:** Two surveys (S1, S2) and one-to-one semi-structured phone interviews. SPs completed S1 (LV services before and during pandemic) and S2 (post-pandemic services). Telephone interviews - SPs purposively recruited. Survey and interview responses analysed using thematic analysis.

**Results:** S1 (N=80), S2 (N=27), telephone interviews (N=11). Five themes emerged:

**Remote services:** Increased during pandemic. Although many were successful and expected to continue, majority reverted to face-to-face post-pandemic.

**Professional working:** During pandemic, many SPs worked partly from home (information governance challenges); those on-site raised infection risks concerns. Some SPs undertook additional/expanded roles. Generally professionals worked collaboratively, but some tensions existed.

**Perceived impact on service users:** Challenges with social distancing, face masks, accessing food etc. Some became more independent during the pandemic; others lost independence.

**Technology usage:** Many service users embraced technology, increasing use during the pandemic. Issues with WiFi were highlighted.

**Caregiver engagement:** Caregiver engagement was beneficial. Pandemic restrictions limited some caregiver contact.

**Conclusions:** The pandemic impacted SPs and support services in many ways, some positive<sup>3</sup>. Post-pandemic many services reverted to pre-pandemic formats, suggesting protocols needed to leverage positive findings from the pandemic onto LV service provision. Government recognition of visual impairment challenges needed.

# Rapid flicker, spatial vision and chromatic sensitivity loss in early glaucoma.

Aiman Hafeez, Alison Binns, Irene Ctori, John Barbur

*City University of London*

**Purpose:** To assess changes in spatial vision, colour discrimination, and rapid flicker sensitivity in ocular hypertension (OHT) and glaucoma patients.

**Methods:** 126 participants (40-88years) included 25 OHT, 55 primary open angle glaucoma patients of varying severity, and 46 age-matched controls. Visual acuity and functional contrast sensitivity (FCS) with positive and negative contrast optotypes was tested with Acuity-Plus test. Chromatic sensitivity was measured with Colour Assessment and Diagnostic (CAD) test. Cone and rod-enhanced flicker detection thresholds were measured at fovea and four parafoveal locations using Flicker-Plus test. Peripapillary retinal nerve fiber layer thickness (pRNFLT) was measured using OCT.

**Results:** Mean age was  $63.4 \pm 11.07$  SD years (48 males, 78 females). Mean pRNFLT reduced with glaucoma severity (early  $76.2 \mu\text{m}$ , moderate  $67.1 \mu\text{m}$ , severe  $52.7 \mu\text{m}$ ) than controls and OHT patients ( $95.9 \mu\text{m}$ ). POAG patients showed higher mean colour thresholds (red/green (RG) 5.44, blue/yellow (BY) 6.63 CAD units) and FCS for positive and negative contrast (64.5% and 51.73%) than controls (RG:1.97, BY: 2.02, 24.24% and 20.48%). OHT patients showed slightly higher colour thresholds (RG:2.32, BY:2.60 CAD units) than controls. OHT patients had normal FCS, but higher than controls. Flicker detection thresholds were higher for glaucoma patients.

**Conclusion:** POAG patients (72%) showed significant flicker sensitivity loss, and 86% of these showed chromatic loss. Only 12% POAG patients showed losses in all visual attributes. OHT patients were least affected, with 20% showing significant BY colour loss, while 92% exhibited normal flicker sensitivity. Glaucoma selectively affects different vision attributes, often affecting chromatic and flicker sensitivity early in the disease.

# An Exploratory Factor Analysis of Visuoperceptual Reading Symptoms in Adults with Visual Stress: Development of the Ulster Visual Stress Questionnaire.

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**Purpose:** Visual Stress is a reading disorder characterised by visuoperceptual distortion symptoms experienced when reading. Visual stress diagnosis is on an ad-hoc basis, with symptomology and diagnostic criteria poorly understood. This study investigated reading symptoms in adults to develop a clinically useful questionnaire for visual stress diagnosis.

**Methods:** A comprehensive 17-item questionnaire was developed probing reading symptoms derived from the existing evidence-base. 1,248 undergraduate students (aged 18-50 years) completed the questionnaire and pattern glare test. 294 participants (23.6%) exhibited pattern glare (scores  $\geq 3$  on a mid-spatial frequency pattern glare test). After exclusion of diagnosed migraineurs, data from 247 participants were analysed. Parallel analysis determined the number of distinct factors and exploratory factor analysis assigned symptoms to these factors. To ensure symptoms mapped to a single factor, retained items needed to satisfy three conditions: (i) load onto their primary factor if  $>0.40$  (ii) cross-load onto alternative factors by  $<0.30$  and (iii) exhibit a difference in item primary factor and subsequent factor loadings of  $>0.20$ .

**Results:** Five factors were identified and mapped well to aetiological theories proposed to explain visual stress: 1) Magnocellular Pathway Deficits 2) Cortical Hyperexcitability 3) Eye Movement/Tracking Issues 4) Aversion to High Temporal Frequency 'Flicker' and 5) Concurrent Pathologies associated with Visual Stress. Post-hoc item analysis reduced questionnaire content to ten items.

**Conclusion:** Exploratory factor analysis enabled systematic creation of the first robust 10-item questionnaire to aid visual stress diagnosis. The questionnaire will be applied in a clinical context and among different age ranges for validation purposes.

# Broadcasting better health: the impact of podcasts on wellbeing in Charles Bonnet Syndrome

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**Purpose:** This study aimed to assess if access to a podcast about managing Charles Bonnet Syndrome (CBS) hallucinations enhances emotional wellbeing and improves attitude towards hallucinations.

**Methods:** Participants were recruited through charities and social media, forming part of a broader study on the psychosocial impact of CBS. Validated patient-reported outcome measures were used to establish a baseline for each participant. Subsequently, participants were provided with a podcast and were encouraged to engage with the content for a period of 2-3 weeks. Following this, participants were surveyed to assess any attitude changes towards hallucinations and changes in emotional wellbeing. This questionnaire included the Positive and Negative Affect Schedule (PANAS) to assess levels of negative affect (measures of negative emotional wellbeing).

**Results:** Fifty-four people with CBS (76% female; 70% aged >65 years) received the podcast. Since listening to the podcast, 36 participants (66%) told new people about their symptoms, 64% of participants found the podcast useful and 42% found it enjoyable. Twenty-two participants (41%) reported a less negative impact of CBS on their lives compared to before listening to the podcast. Overall, there was a statistically significant improvement in the reported impact of CBS on participants' lives after the podcast ( $p < 0.01$ ). Additionally, there was a statistically significant reduction in levels of negative affect after the podcast ( $p = 0.02$ ).

**Conclusions:** The podcast inspired a significant improvement in emotional wellbeing, with reductions in negative affect and the perceived negative impact of CBS. These findings suggest that podcasts could positively influence emotional health in CBS patients.

# The flipped classroom approach in optometry education; a help or a hinderance?

Angharad Hobby

*The University of the West of England*

**Purpose:** The Flipped Classroom (FC) approach introduces initial concepts to students prior to in-person teaching sessions<sup>1</sup>. This study investigated optometric educators opinions regarding benefits and risks of FC.

**Methods:** Optometry educators across the UK participated in a questionnaire (16 Likert Scaled, two 'free-text' questions). Quantitative data was analysed to ascertain measures of agreement with reported advantages and disadvantages of FC. Thematic analysis was used to explore qualitative data to identify trends in perspectives of FC.

**Results:** Of the 29 participants that completed the questionnaire 96% felt FC has value in optometric education. The majority (69-93%) agreed that FC allows for delivery of more engaging in-person sessions and provides a greater opportunity for flexible learning/development of time management skills/other professional assets. Additionally, the majority (76-90%) agreed FC potentially risks students falling behind due to poor engagement or feeling overwhelmed. Thematic analysis supported this and further explored disadvantages such as lack of engagement and the potential for FC to create gaps between higher performing students and those with additional needs/access issues. Interestingly, it was observed that students with additional needs can often excel with FC and perhaps lack of educator awareness in this area could be contributing to some gaps in engagement/attainment.

**Conclusions:** FC is a valuable tool providing many advantages in the delivery of optometry education. Some risks exist with this approach, often related to engagement and additional needs. Further investigation into cultural changes in education and educators understanding of/adaptions for additional needs would be beneficial.

# Specifying Entrustable Professional Activities for Optometric Practice

William Holmes, Catherine Porter, Claire Mallon, Ketan Parmar

*The University of Manchester*

**Purpose:** The most common way to establish whether an individual is competent to perform the work of an optometrist is to use single point in time high stakes assessments (e.g. written exams, oral exams, objective structured clinical examinations). The validity of this approach has been questioned (Thoma et al., 2022, Sidhu and Fleming, 2024). The concept of Entrustable Professional Activities (EPAs) was developed by Olle ten Cate in the mid 2000s. It has been argued that EPAs are an alternative to the current high stakes approaches used in optometry programmes (Holmes et al., 2024). The purpose of this work was to draft terminal EPAs for use in the MSci Optometry Programme at The University of Manchester.

**Methods:** Four clinician-academics produced a first draft of 13 terminal EPAs using AMEE guide number 140 (ten Cate and Taylor, 2021). These EPAs were then further refined during a workshop in September 2023 with input from clinicians from a wide variety of practice modalities (multiple, independent, hospital and domiciliary).

**Results:** Fourteen EPAs titles were drafted along with specifications and recommended entrustment levels.

**Conclusions:** The draft EPAs represent an attempt to describe the day-to-day work of an optometrist. In order to further verify them we are currently running a Delphi study with optometrists in practice across England. The final set of EPAs will be used throughout the third and further year of the Manchester Optometry MSci.

# Content Analysis of Patient-Facing Literature in Cataract Surgery: NHS Scotland

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**Purpose:** Patient involvement with target refraction (TR) selection in cataract surgery is recommended as part of pre-surgical education and decision-making<sup>1-3</sup>. Recent reports indicate this is not necessarily taking place<sup>4</sup>. This study aimed to assess the content, and the readability of written cataract surgery information leaflets provided to patients prior to consent by NHS Scotland. A specific focus was to assess the refractive and intra-ocular lens information provided to patients.

**Methods:** Fifteen leaflets were sourced from Scottish NHS Health Boards via an electronic search or contacting ophthalmology departments. Each leaflet was analysed using inductive content analysis and the calculation of readability scores. Topics discussed, presence of visual or supplementary information, tone, development and accessibility information were considered and compared.

**Results:** A wide variance in i) content; ii) readability; and iii) presentation of information across the leaflets. Significant differences between language and tone were noted. Sixteen different topics were identified and discussed across leaflets. Twelve leaflets highlighted a potential change in spectacle prescription following surgery, five stated reading glasses will be needed. Advanced intra-ocular lens types and the ability to tailor TR was addressed in one leaflet. Mean readability scores met UK government recommendations for written information (average 9–14-year-old).

**Conclusion:** Findings highlight the diversity of leaflets used across Scottish health boards. Steps to develop a unified leaflet are suggested to ensure all patients can access the same information, independent of their location. Information provided to patients (written or verbal) can promote health literacy and understanding.

# Antimicrobial efficacy of ultraviolet C and contact lens solutions against planktonic *Pseudomonas aeruginosa* and *Staphylococcus aureus* in vitro

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**Purpose:** In-vitro comparison of the antimicrobial efficacy of ultraviolet-C (UVC) and contact lens solutions against planktonic *Pseudomonas aeruginosa* and *Staphylococcus aureus*.

**Methods:** UVC device was compared with ASept Plus HydraGlyde, Renu Advanced MPS, Opti Free Puremoist, and BioTrue multipurpose solutions (MPS) for its antimicrobial efficacy. UVC and solution-soaked discs were exposed to agar plates inoculated with *Staphylococcus aureus* and *Pseudomonas aeruginosa*. Benzalkonium chloride (BAK) was used as a positive control, and saline as a negative control. Inhibition zone diameters were measured after overnight incubation at 37°C.

**Results:** Results indicate that BAK showed the largest inhibition zones,  $23.0 \pm 0.0$ mm against *S. aureus* and  $12.0 \pm 1.0$ mm against *P. aeruginosa*. Saline and Opti Free Puremoist showed no inhibition. ASept Plus HydraGlyde had inhibition zones of  $9.7 \pm 0.3$ mm against *S. aureus* and  $9.7 \pm 3.2$  mm against *P. aeruginosa*. Renu Advanced MPS and BioTrue MPS showed inhibition zones of  $6.7 \pm 0.6$ mm and  $5.0 \pm 0.0$ mm, respectively, against *S. aureus* but none against *P. aeruginosa*. UVC had similar inhibition zones of  $4.7 \pm 0.3$ mm against *S. aureus* and  $4.7 \pm 0.8$ mm against *P. aeruginosa*.

**Conclusion:** Results indicate the antimicrobial activity of each contact lens solution against *S. aureus* and *P. aeruginosa*, with larger inhibition zones showing stronger effects. BAK had the highest efficacy, while saline showed no effect. Solutions were more effective against *S. aureus* than *P. aeruginosa*. UVC had similar antimicrobial effects on both bacteria, suggesting its potential as an alternative for disinfecting contact lenses and cases.

# Making the 'Eye Clinic Support Studies Course' accessible, ensuring the needs of our visually impaired ECLOs are met

Stevie Johnson, Donna Ledwidge

*Royal National Institute of Blind People (RNIB)*

Almost 50% of the Eye Clinic Liaison Officers employed by RNIB are themselves visually impaired. Some are Guide Dog users, some have Support Workers, some can access the usual training resources. It is vital that the training we provide is entirely accessible and sets the standard across the sector.

This presentation will describe the various ways we ensure the training is accessible, from choosing the best venue, to creating tactile diagrams, and how we facilitate the exams. We will include feedback from our students.

# Objective analysis of choroidal thickness in children using the Lenstar

Daisy Kynman-Sprinks, James S. Wolffsohn, Sayantan Biswas

*Aston University*

**Purpose:** To develop and assess a technique to objectively determine retinal and choroidal thickness from Lenstar LS900 biometry scans.

**Methods:** The Lenstar axial scan shows reflectance peaks for the corneal, crystalline lens, retinal and choroidal surfaces. Currently manual, subjective measurement of the retinal thickness and choroidal thickness is used. Bespoke software was developed (Labview, National Instruments), fitting a quadratic polynomial to sequential data points to allow sub-increment resolution and identification of these thicknesses. Repeatability was assessed on 10 scans analysed subjectively and objectively by a masked observer on separate occasions. Retinal and choroidal thickness of 20 children (mean age 7.6 years) was also assessed using both techniques.

**Results:** The repeatability (mean  $\pm$  standard deviation) of subjective retinal ( $1.24 \pm 0.63 \mu\text{m}$ ) and choroidal thickness ( $1.89 \pm 0.97 \mu\text{m}$ ) measurements was poorer than that analysed objectively ( $0.00 \pm 0.00 \mu\text{m}$  for both). When the scans were averaged, the signal-to-noise ratio of the choroidal-scleral peaks (intensity compared to that of the vitreous humour) increased by  $21 \pm 62\%$  ( $p=0.35$ ) and the difference between the average of the individual scans and the averaged scan was  $1.8 \pm 7.8 \mu\text{m}$  ( $p=0.85$ ) for the retinal thickness and  $-1.1 \pm 14.5 \mu\text{m}$  ( $p=0.58$ ) for the choroidal thickness. A comparison between the average objective and subjective analysis for each child showed that the retinal ( $185.1 \pm 19.9$  versus  $185.3 \pm 21.6 \mu\text{m}$ ,  $p=0.23$ ) and choroidal thicknesses ( $267.3 \pm 40.6$  versus  $269.0 \pm 51.7 \mu\text{m}$ ,  $p=0.23$ ) measured were similar.

**Conclusions:** Choroidal thickness is an important parameter when monitoring myopia progression. Objective analysis of the Lenstar trace can improve repeatability, hence detection sensitivity compared with subjective analysis.

# Humanising health care: Assessing the impact of an educational resource sharing real life patient stories with eyecare students.

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1: *Vision and Eye Research Institute, Anglia Ruskin University*

2: *Cardiff University*

**Purpose:** A creative educational resource was produced to introduce eyecare students to the impact of sight loss on mental wellbeing. Its aim is to ‘humanise’ healthcare, providing greater understanding of how living with sight loss can affect wellbeing, increasing students’ confidence to address mental health and understanding the actions available to them. The first deliveries of the resource are evaluated to assess its impact.

**Methods:** The resource consists of videos covering 4 personal stories, patient views on practitioners discussing mental health, and role play of screening for depression, along with accompanying textual introduction and reflection points for students and educators. Surveys consisting of rating-scale questions and free-text comments were completed by students before and after delivery, and after delivery by educators.

**Results:** Feedback was received from 362 students before and 234 after delivery, and from 8 educators. Resources had significant positive effect on students’ perceived understanding, knowledge, and confidence in discussing depression with a person with sight loss from rating-scale questions (all  $p < 0.001$ ). The free-text theme with highest content analysis coverage regarding resource impact was having increased awareness of patients’ perspectives and experiences ( $n=110$ ), and what students might do differently was to communicate about mental health ( $n=85$ ). Educators found the resources useful, were likely to use them again, and increased their confidence in teaching this topic.

**Conclusions:** Videos featuring the patient perspective can be valuable to eyecare students. The current content was appreciated by educators and improves students’ perceived ability in managing mental wellbeing of people with sight loss.

# The binocular vision profile of stroke survivors: An investigation

Malcolm Maciver, James Wolffsohn, Nicola Logan

*Aston University*

**Purpose:** With an ageing population the incidence of stroke is increasing, and remains one of the leading causes of disability worldwide. While a number of studies have reported the presence of anomalies of ocular alignment, oculomotor dysfunction and vergence anomalies, this has not been assessed systematically. The purpose of this study was to investigate the clinical binocular visual parameters of a cohort of stroke survivors.

**Methods:** Examination of oculomotor, vergence and aligning prism were undertaken on 22 participants with a history of stroke, and 26 age matched controls.

**Results:** Incomitant deviations ( $p=.089$ ), and anomalies of saccade ( $p<.001$ ) and pursuit ( $p<.001$ ) eye movements were observed more frequently within the stroke cohort. No differences in heterophoria or vergence ranges were observed between cohorts. While no significant difference in stereoacuity was observed, the Stereo Fly test was found to elicit measures of stereoacuity in a greater proportion of the stroke cohort than the TNO test ( $p=.008$ ). Where required, prismatic correction at distance was strongly associated with the distance aligning prism ( $p<.001$ ), while near prismatic correction was moderately associated with the near heterophoria ( $p=.001$ ) measured.

**Conclusions:** Few differences in binocular function were observed between cohorts. Clinical measures of binocular function fell below expected normals across a number of areas. While normals are well evidenced in younger cohorts, few studies have been published outlining data in older cohorts. Future studies should be conducted to identify appropriate normals for binocular testing in older populations.

# Emotional health difficulties of adults with vision impairment entering a low vision rehabilitation service in England

Jane Macnaughton, Keziah Latham

*Vision & Hearing Sciences Research Centre, Anglia Ruskin University*

**PURPOSE:** To assess self-reported difficulties with emotional health tasks using the Emotional Health Scale of the Participation and Activity Inventory in a sample of adults with vision impairment.

**METHODS:** 60 participants with acquired vision loss were recruited at the point of referral to vision rehabilitation services. Participants rated the difficulty of 23 tasks of emotional health on a 4-point Likert scale (from 'not difficult' to 'impossible'). Rasch analysis was conducted to derive item measures from task ordinal scores where the item measures represent the overall difficulty of each task across all participants.

**RESULTS:** Participants had a mean age of  $75.8 \pm 13.8$  years. 63% were female, with 50% having a primary diagnosis of age-related macular degeneration. 47% lived alone and 32% reported a history of depression or anxiety. 83% were registered Sight Impaired, and 15% as Severely Sight Impaired. Emotional health tasks with the highest difficulty levels were dealing with frustration, anger or despair, performing daily activities without discomfort in the eyes, staying focused and concentrated, sustaining daily activities during the day and dealing with gloomy or sad feelings.

**CONCLUSIONS:** Key emotional health difficulties for patients with vision impairment relate to frustration and fatigue with visual tasks. Patients may not be aware of the emotional difficulties involved in coming to terms with vision loss. Optometrists should be aware of the potential need for emotional support and are encouraged to identify referral routes to appropriate local service provision.

# Understanding deafblindness in young people: Priorities and Perceptions of Stakeholders

Claire Manford

*Anglia Ruskin University*

**Purpose:** Deafblindness, a multisensory disability comprising of both vision and hearing loss, can greatly affect daily functioning, but remains under-researched. Priorities for research are urgently required particularly for young people because of the effect on learning and interacting with peers. The aim of this study was establishing research priorities from stakeholders. Additional aims included identifying the academic and social challenges and successes and the perceived awareness of deafblindness

**Methods:** Data collection comprised of online focus groups with parents of children with deafblindness (n=10) and professionals working with children with deafblindness (n=14). Data collection for young deafblind people (n=6, males=2, females=4), was via a Padlet discussion board which participants were able to independently access, answering a series of questions, allowing written interactions. Data analysis comprised of reflective thematic analysis of the anonymised transcriptions with two researchers coding the data independently.

**Results:** The following themes and subthemes were identified, (1) Spectrum of deafblindness (with subthemes for terminology, educational ideology, uniqueness of individual, awareness and understanding of deafblindness, and being othered), (2) Support and access to education (with subthemes for adaptations/modifications to the curriculum (hidden and taught), adaptations to the physical environment, multi-professional liaison, and communication preferences, and (3) Personal and social development (with subthemes for social networks vs. social isolation, independence, advocacy and hobbies).

**Conclusions:** Despite differing priorities between participant groups, across all groups there is a consensus that deafblindness is misunderstood and that the terminology needs to be defined.

# Review of “paired-eye” methodology for myopia control RCTs and animal studies in myopia

Lewis Marshall, Miriam Conway, David Edgar, Bruce Evans, Chris Hull

*City St George, University of London*

**Purpose:** Most myopia control trials are parallel group (between-subjects) randomised controlled trials (RCTs). Within-subjects designs - when each participant acts as their own control - require fewer participants for a given treatment effect to reach statistical significance. Paired-eye research seems an appropriate within-subject design for myopia control research because axial elongation signals are believed to be localised within each eye. The purpose of this review is to identify and analyse paired-eye studies, either RCTs investigating myopia control in human participants or animal studies relevant to myopia, in order to explore advantages and limitations.

**Methods:** Academic literature databases were searched for [“myopia control” OR “myopia management”] AND [“contralateral” OR “paired-eye” OR “paired eye”]. Criteria were set to determine the final set of studies for analysis.

**Results:** The search found 413 papers, of which 6 were paired-eye RCTs investigating myopia control in humans. 80 animal studies were identified utilising the paired-eye approach. Advantages for paired-eye designs versus parallel group RCTs included elimination of variability caused by between-subject differences, reduced sample size, reduced study duration, and reduced placebo exposure. No major limitations were found with paired-eye methodology. There were no data in humans indicating response in the contralateral eye to monocular myopia control interventions and very limited evidence from animal models. For lens-induced myopia and form deprivation, significantly increased axial elongation compared to the untreated eye is an established finding across animal models.

**Conclusion:** Paired-eye methodology is valid, seems particularly well-suited to research on myopia control, and appears to be an under-used approach.

# Student perceptions of online teaching in undergraduate optometry.

**Michelle Mehta**

*City, University of London*

**Purpose:** Offering flexibility and convenience, propelled by the Pandemic, online learning is gathering in popularity. Therefore, there is the need to consider the role of online teaching with patient-focused courses. In this investigation, a systematic review of available evidence about the efficacy and acceptance of online teaching in undergraduate optometry was conducted.

**Methods:** The Preferred Reporting Items for Systematic reviews and Meta-Analyses was used to undertake a systemic review. An initial online search was conducted in October 2023 using Google/ Google Scholar, City University Library database, PubMed, Web of Science, and Taylor and Francis. Inclusion criteria were articles written in English, published after 2004, and the availability of full texts online. The PICO approach and the Critical Appraisal Skill Program Tool were used to undertake review and quality assessment respectively.

**Results:** The final search yielded ten articles; all questionnaire-based studies, conducted across six different countries. Four were carried out in response to global lockdowns and one when online teaching in its formative stage. Qualitative analysis alluded to positive student attitudes, offering flexibility and convenience and acceptance for theoretical teaching. However, a reliance and preference for educator-peer-contact was expressed. Nevertheless, clinical, skills-based teaching must occur physically.

**Conclusions:** Student attitudes with online learning in undergraduate optometry can vary significantly; internet connectivity and digital poverty may influence perception. Pandemic-related lockdowns accelerated acceptance. Insights into what students deem to be effective was also revealed. For more effective online delivery, the need for adequate training and support for staff and students was identified.

# “A whole new set of problems”: A qualitative evaluation of a home trial of wearable electronic vision enhancement systems for people with age-related macular degeneration.

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2: UCL Institute of Ophthalmology, London

**PURPOSE:** To understand the views of people with age-related macular degeneration (AMD) regarding the usefulness of wearable electronic vision enhancement systems (wEVES) after an extended home trial.

**METHODS:** Following a 6-week non-masked cross-over trial, semi-structured interview data were collected from 34 participants with AMD, 64.7% female, mean age 80.2(±6.0), mean distance Visual Acuity 0.81logMAR(±0.32). Reflexive Thematic Analysis was used to analyse data and develop themes.

**RESULTS:** Four themes were identified. Firstly, participants expressed delight in the potential of an appealing spectacle-style wEVES to provide both new and complementary solutions. Imagined usefulness included improving routine tasks such as reading, shopping and television, as well as resuming abandoned activities like craftwork and the arts.

The second theme captured significant performance barriers that prevented users from completing activities as desired. Barriers included image quality, screen size, and short-lived adverse effects.

The third theme conveyed the multiple practical challenges wEVES presented, including slow start-up times and the inability to use when moving. Most notably, practicality barriers limited the device's utility with facial recognition, even when performance appeared superior to other solutions.

The final theme reflected users' feelings that wEVES remained a desirable concept requiring inclusive input from intended end users to improve future iterations.

**CONCLUSIONS:** Prescribers of wEVES should appreciate that participants' satisfaction shifted over the course of the trial. Initial joy was tempered by limitations in function and practicality. While this change of view lessened participants' perception of the device's usefulness, they remain interested in trying new, more inclusively designed devices.

# The prevalence of refractive errors in Vietnamese children: A systematic review and meta-analysis

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1: *University of Bradford*

2: *Wolfson Centre for Applied Health Research, Bradford*

**Purpose:** The aim of this study was to systematically investigate and evaluate the prevalence of refractive error (RE) in Vietnamese children.

**Methods:** A structured search was performed to capture all studies published on RE prevalence in Vietnamese children under 18 years of age in either English or Vietnamese languages up to April 2024, using the online databases including Medline, Embase, Web of Science, Scopus, and CINAHL. The systematic approach was carried out by two researchers independently, following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Article quality was evaluated using Strengthening the reporting of observational studies in epidemiology (STROBE) checklist (PROSPERO registration ID: CRD42024524780). Data extraction was performed and used to estimate the pooled RE prevalence, using the random effects model.

**Results:** A total of 327 relevant studies were found, of which 14 school-based studies were identified in this systematic review (n=25,467; age: 6-18 years old) and 6 studies qualified for meta-analysis inclusion (n=15,825; age: 6-16 years old). The definitions for RE, data collection methods, and reported prevalence of RE varied in different studies. The pooled RE, myopia, hyperopia and astigmatism prevalence were calculated respectively as 38% (95%CI: 28-47), 29% [95%CI: 19-38], 3% [95%CI: 0-7], and 12% [95%CI: 0-25] with heterogeneities over 99%,  $p < 0.01$ .

**Conclusions:** This is the first-ever systematic review and meta-analysis of RE prevalence in Vietnamese children and indicates a significant presence of RE in the population. However, the high heterogeneity suggests that further research is required to achieve more accurate estimates.

# Exploring Parental Views of Remote Vision Testing in Children

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*City, University of London*

**Background:** The rise of digital technologies has led to a surge in visual acuity testing apps for devices like computers, iPads, and phones, enabling tests to be administered anywhere, not just in clinics. These tests offer parents the opportunity to conduct vision testing independently. This study aims to explore parents' views on the perceived advantages and obstacles of at-home vision testing for young children.

**Research Aim:** This qualitative research study aims to gain insight into the viewpoints of parents on remote vision testing at home in a paediatric demographic.

**Methodology:** Study used online focus groups for data collection. Two focus groups, each with parents of children aged four to eight, were audio, video recorded and transcribed. Thematic coding was used to identify patterns and themes.

**Results:** Five themes were identified, navigating trust in remote vision testing, impact of child demographics, desire for professional support, digital enablers and barriers and the frequency of appointment influence desire for remote testing. Participants highlighted several essential elements: Training programmes are necessary to improve parents' confidence and competence in conducting at-home vision testing. Remote vision testing offers reduced travel time and expenses, less time away from school/work and increased flexibility. However, parental concerns like testing distances, correct occlusion of non-testing eye and new app accuracy will require clear directions, training, and virtual supervision with a healthcare professional

**Conclusion:** The study highlights remote vision testing as a dependable and effective alternative to in-clinic testing, given parents receive suitable training and support.

# Embedding Digital Literacies, in Relation to Ocular Diagnostic Digital Technology, in the Optometry Curriculum at City, University of London

**Bina Patel**

*City, University of London*

**Purpose:** The need to create a digitally literate healthcare workforce has been driven by Health Education England. This, together with increasing technologies used in delivering eyecare, combined with an educational reform underway, the need for digital literacies to be embedded in the optometry curriculum is vital. This study explored the significance of digital literacies in the optometry curriculum at City, University of London in relation to ocular diagnostic digital technology (ODDT) and identify potential gaps between taught and applied digital literacies. The study also investigated the experiences of educators in the optometry department towards digital literacies.

**Methods:** Study participants (n=7) were educators in the optometry department with varying levels of experience (1-12 years) and roles (clinical leads, lecturers- education or education and research). Semi-structured interviews were conducted.

**Results:** This study identified that digital literacies do play a significant role in optometric practice through ODDT and other technologies and also for optometry educators in their teaching and research roles. The findings highlighted some interesting differences in the understanding and experiences of digital literacies between clinical leads and lecturers. This could have been attributed to the differences in the digital training and education undertaken by these groups.

**Conclusion:** It is important to address the disparities between educators and bridge the gap to ensure consistency in understanding, so this can then translate to effective and equitable teaching. This can then be built on to develop the optometry curriculum and embed digital literacies, in general and not just in relation to ODDT, within it.

# Good things to those who wait: Evaluating the feasibility of performing sight tests in hospital waiting rooms

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**Background:** Waiting time in clinics could be used to acquire additional patient data that could support clinical decision-making. We evaluated the feasibility of conducting portable contrast sensitivity (CS) tests in hospital clinic waiting areas. Here we examine the hypothesis that these tests would not disrupt clinical flow and be acceptable to patients.

**Methods:** Patients attending glaucoma clinics at Moorfields Eye Hospital (Bedford) were invited to perform one of two portable CS tests: Spotchecks (a pen and paper-based test) and PopCSF (a gamified iPad-based test). Participants separately completed the Pelli-Robson test. Noise levels, light levels, seating location, test usability feedback and total time spent in the clinics were also recorded.

**Results:** Spotchecks (n=77) and PopCSF (n=74) had completion rates of 99% and 100%, respectively, with median (interquartile range; IQR) completion times of 150 [120,187.5] and 120 [120,150] seconds. Median (IQR) time spent in the clinic was 109 [84.8,158] minutes, compared to 93 [66,144] minutes for non-study participants (n=151; P=0.002). Most participants reported feeling comfortable (88%) and supported (89%) performing these tests in the waiting room, and 94% agreed that it is sensible to utilise the patient's time in the waiting room. CS measurements from Spotchecks (r=0.81, P<0.001) and PopCSF (r=0.60, P<0.001) were associated with those from the Pelli-Robson reference test.

**Conclusion:** Portable CS tests done in a clinic waiting room are acceptable to patients and may provide meaningful data but may add time to the total time spent in the clinic.

# Effect of Tixel® treatment on meibomian gland loss.

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**Purpose:** To determine whether the percentage of meibomian gland (MG) loss and MG ghost areas varies in response to Tixel® treatment in patients with dry eye disease (DED).

**Methods:** This study included 11 participants with an ocular surface disease index (OSDI) score  $> 23$  and non-invasive tear breakup time (NIBUT)  $< 10$  secs. The study had a total of 6 visits. The first 4 visits were separated by an interval of 2 weeks + 5 days. The last 2 visits took place after 18 weeks (from the 1st visit) and after 30 weeks (from the 1st visit), respectively. Treatment with Tixel® was only given for the first 3 visits. Along with Meibographies, clinical parameters such as OSDI score, NIBUT, and tear meniscus height (TMH) were recorded at each visit. Changes in percentage of MG loss and area of ghost glands were analysed manually with image processing software – ImageJ to understand the changes over time.

**Results:** The study included 7 females and 4 males. The percentage of MG loss and MG ghost areas between visits 1 and 6 did not show any significant difference. There was a statistically significant difference in the mean OSDI score ( $P < 0.001$ ) and NIBUT ( $P < 0.01$ ) over the study period. However, there was no significant difference in the mean values of TMH ( $P > 0.05$ ).

**Conclusions:** Tixel® could be a new treatment for DED. This treatment is associated with significant improvement in DED symptoms and signs without having any adverse effects, especially on MGs.

# Scotomas in the supermarket: Quantifying the effect of simulated visual field defects using a virtual reality shopping task

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**Purpose:** To quantify the relative impact of scotoma size and eccentricity on vision-related Quality of Life (vrQoL).

**Methods:** Normally sighted subjects (n=19; additional data collection ongoing) were asked to locate lists of household products in a virtual reality (VR) supermarket. Participants were able to physically move around the supermarket (body-tracking), using their hands to pick up lists of prespecified items from shelves and deposit them into a virtual trolley. The open-source “VARID” toolkit<sup>1–3</sup> (varid.co.uk) was used to generate gaze-contingent scotomas of variable size and eccentricity. Each participant experienced five bilateral scotomas, varying in eccentricity (1° – 9°) and/or radius (1° - 9°). Outcome measures included task-completion times; quantities of head and eye movements; and numbers of errors (e.g., number of items knocked over).

**Results:** Participants spent longer searching for items in the presence of a 9° radius scotoma at 9° eccentricity, versus no impairment (mean {95%CI} increase vs. no impairment = 66 {12 – 120} secs, P=.023). The effect was reduced by only 35% when participants experienced a 1° radius scotoma at 1° eccentricity (mean {95%CI} increase vs. no impairment = 38 {4 – 72} secs, P=.029). Further analyses, including those examining additional outcome measures, are ongoing and shall also be reported.

**Conclusion:** The eccentricity of a scotoma --- and specifically whether it impinges upon the fovea --- greatly impacts performance on the present visually guided “real world” search task, much more so than the absolute size of the scotoma. More generally, this work demonstrates the potential of immersive, interactive VR environments to objectively quantify vrQoL.

# Topically Administered Ocular Ranibizumab: A Combined Experimental and Mathematical Study

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2: *University of Birmingham*

**Purpose:** Anti-vascular endothelial growth factor (VEGF) treatments such as ranibizumab (RBZ) are currently administered to treat wet AMD via intravitreal (in vit) injections, which is unpleasant, expensive and risks complications. We explored the efficacy of topically administered RBZ using an ex vivo pig eye model with cell penetrating peptides (CPPs), using mathematical modelling to extrapolate to the human eye.

**Methods:** Ex vivo pig eyes were divided into 3 groups and treated with 1. topical RBZ+CPP, 2. in vit RBZ+CPP, or 3. in vit RBZ, with in vit dH<sub>2</sub>O for controls. ELISAs measured RBZ and VEGF concentrations in the aqueous (Aq) and vitreous (Vit) at 20min, 40min, 1h & 3.5h (n=3, per group). An ordinary differential equation (ODE) model was formulated to describe the evolving concentrations of RBZ, VEGF and their compounds in the tear, aqueous and vitreal compartments.

**Results:** Experimental – Topical RBZ+CPP: Aq RBZ levels increased significantly, coincident with a significant drop in Aq VEGF. Vit RBZ increased gradually and significantly, while Vit VEGF remained constant. In vit RBZ+CPP: Aq RBZ first detected in significant quantities at 3.5h, while Aq VEGF remained constant. Vit RBZ increased steadily and significantly, coincident with a significant drop in Vit VEGF. In vit RBZ alone: Aq RBZ present in significant quantities by 1h, while Aq VEGF remained constant. Vit RBZ remained constant, while Vit VEGF undetectable from 40min. Mathematical – parameter sensitivity of RBZ dose delivered to retina explored.

**Conclusions:** CPP allows topical RBZ to penetrate the cornea, but reduces RBZ availability and efficacy in neutralising VEGF for in vit treatment.

# Patient experiences using multipurpose and hydrogen peroxide solutions for monthly replacement contact lenses

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**Purpose:** To investigate participants' experiences of multipurpose and hydrogen peroxide contact lens solutions.

**Methods:** Pre-existing contact lens wearers were recruited to a prospective, single-masked, randomised trial of three lens care solutions (ClearCare, Alcon; MeniSept, Menicon; Opti-Free PureMoist, Alcon).<sup>1,2</sup> Each solution was trialled for a month. Unlabelled solutions were provided with their corresponding cases and anonymised manufacturer's instructions. Participants wore new monthly-disposable Asmo-filcon A (Miru 1month; Menicon) silicone-hydrogel lenses with each solution. Subjective measures of comfort, vision, and overall satisfaction were collected using the validated CLDEQ-8 questionnaire,<sup>3</sup> and supplementary survey with 0-10 Likert scales. Friedman tests, with Bonferroni-corrected post-hoc analyses where appropriate, were performed in SPSS.

**Results:** Thirty participants completed the study (mean age 25.6± 8.0 years; 73.3% female; 40% white, 55% Asian, 5% Arab). Median [IQR] CLDEQ-8 scores were 15.5 [11.3-20.8], 14.0 [8.0-19.0], and 16.0 [9.3-19.8] for ClearCare, MeniSept, and Opti-Free respectively (P=0.58). Similar scores were found for overall comfort (ClearCare 7.0 [6.0-9.0], MeniSept 8.0 [6.0-9.0], Opti-Free 7.0 [6.0-8.0]; P=0.88), overall vision (ClearCare 9.0 [7.3-10.0], MeniSept 8.0 [7.0-9.0], Opti-Free 9.0 [8.0-10.0]; P=0.44), and solution satisfaction (ClearCare 9.5 [7.3-10.0], MeniSept 9.0 [8.0-10.0], Opti-Free 9.0 [8.0-10.0]; P=0.91). Wear time (hours/day) using MeniSept (10.0 [8.0-10.0]) was slightly longer than ClearCare (9.0 [7-10], P=0.42), and significantly longer than Opti-Free (8.0 [7-10]; P=0.03).

**Conclusion:** Although practitioners may consider multipurpose solutions as more convenient, participants rated all solutions similarly. Despite this, the greater wear time with MeniSept potentially suggests longer-lasting comfortable wear time. Practitioners should not be dissuaded from prescribing peroxide-based solutions.

# Barriers and facilitators for engaging underrepresented ethnic minority populations in research: a narrative review.

Tarnjit Sehmbi, Shahina Pardhan

*Anglia Ruskin University*

**Purpose:** Research highlights that participation of ethnic minority individuals in research is low at national level when compared to white counterparts. This poses issues for healthcare, as lack of representativeness in research means that research findings cannot be generalised, and do not provide us with a full picture of how minority populations are affected. This leads to health inequality as these populations are underserved. This narrative review explores the barriers and facilitators of engaging minority individuals in research in order to understand and facilitate better engagement of different communities in research.

**Methods:** Three databases were searched (MEDLINE, CINAHL, PsycINFO) using the EBSCO platform, resulting in 1316 articles, of which 29 met the inclusion criteria.

**Results:** The main barriers for research participation were: mistrust of healthcare professionals, logistical challenges, language and cultural barriers, and the topic being explored. Various facilitators that may support better research participation included: ensuring transparency around the aims and objectives of the research with participants, building rapport, employing culturally competent researchers, personalised approaches, respecting cultural values, offer of incentives, and the use of community facilitators.

**Conclusions:** To enable wider participation, it is important to understand not only the barriers but also to employ culturally appropriate facilitators and make more effort to use patient and public involvement (PPI) groups across the whole research pathway, offer cultural training for researchers, and adopt a more collaborative way of working. This review highlights the work that needs to be done to make research accessible and inclusive for ethnic minority groups.

# Development of an Adult Low Vision Services Quality Framework

Preeti Singla, Louise Gow

*RNIB*

**Purpose:** UK low vision services are historically fragmented. Lack of standardised commissioning or clinical framework means many people with sight loss cannot access fit for purpose services. The Adult Low Vision Service Quality Framework was developed with extensive cross-sector collaboration to help improve commissioning and support planning and evaluation of new/existing low vision services.

**Methods:** Literature searches on low vision standards, governance and service guidance were conducted. Following a survey of UK low vision practitioners we created a group of representatives from the hospital eye service, primary care optometry, orthoptics, universities, vision rehabilitation specialists, people with lived experience and third sector organisations to collaboratively determine the components of a high-quality low vision service and potential barriers to providing care. A draft framework was piloted within low vision sites before creating a final version. Good Practice Guidelines were produced to support and explain each of the criteria.

**Results:** The result of this extensive 4-year collaboration is the publication of The Adult Low Vision Services Quality Framework, endorsed by 12 sector organisations and the supporting Good Practice Guidance.

**Conclusion:** If the framework is adopted as a quality standard by all UK low vision services patients will be able to access timely, high-quality support wherever they live, and commissioners will be upskilled to make good decisions in terms of funding new services. The RNIB Adult Low Vision Services Quality Framework forms a key part of the commitment of the NHS to provide an eye care support pathway alongside the clinical care pathways.

# Investigating the number of retinal ganglion cells underlying novel perimetric area-modulation stimuli exhibiting complete spatial and spatiotemporal summation at threshold in glaucoma

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**Purpose:** To investigate the number of retinal ganglion cells (RGCs) underlying area-modulation stimuli (scaled to exhibit complete spatial and spatiotemporal summation in patients with glaucoma) at threshold.

**Methods:** Threshold was measured with two area-modulation stimuli of 200ms (AMS200 [ $\Delta I$ : 5cd/m<sup>2</sup>] or 16ms (AMS16 [ $\Delta I$ : 9cd/m<sup>2</sup>]) duration, and two luminance-modulated stimuli (Goldmann III [GIII] and Goldmann V [GV]) in 37 glaucoma patients (median[IQR] age (years): 68.6 [58.0, 75.5], MD (dB): -3.3 [-1.3, -6.9]) and 53 control participants (age: 61.7 [51.9, 69.7], MD: 0.5 [-0.7, 1.5]). Thresholds were expressed on a common energy scale (luminance  $\times$  area  $\times$  duration). RGC numbers were estimated from ganglion cell layer thickness on OCT at two test locations (9.9 and 13 degrees eccentricity), accounting for RGC cell body displacement from receptive fields.

**Results:** RGC estimates underlying area-modulation stimuli at threshold were constant with eccentricity in healthy eyes, but greater in damaged locations in glaucoma. By-location differences in estimates between glaucoma patients and the mean of controls were close to zero for GIII, negative for GV, but higher (some very high) for area-modulation stimuli, particularly AMS16.

**Conclusions:** A greater number of RGCs underlying AMS stimuli at threshold in glaucoma suggests that, unlike with eccentricity in healthy eyes, the same critical number of RGCs is not sufficient to achieve threshold. However, if dysfunctional cells underlie the stimulus, a greater total number of cells may be required to achieve threshold. Results suggest that AMS stimuli (particularly AMS16), may detect additional dysfunction signal in glaucoma compared to conventional luminance-modulating stimuli.

# Signal/noise ratio for perimetric stimuli: a comparison between conventional luminance-modulating stimuli and novel area-modulated stimuli optimised to measure changes in spatial and temporal summation in glaucoma

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**Purpose:** To compare area-modulated stimuli (AMS), designed to measure two biomarkers in glaucoma (spatial and temporal summation), with conventional luminance-modulated stimuli (LMS).

**Methods:** Disease signal (DS), response variability (RV), and signal/noise ratio (SNR) were determined for two AMS of 200ms (AMS200 [ $\Delta I$ : 5cd/m<sup>2</sup>]) or 16ms (AMS16 [ $\Delta I$ : 9cd/m<sup>2</sup>]) duration, and two LMS (Goldmann III [GIII] and Goldmann V [GV]) at four locations (9.9-20 degrees) in 52 glaucoma patients (median [IQR] age (years): 69.1 [58.9, 75.3], MD (dB): -3.1 [-1.3, -6.8]) and 53 controls (age: 61.7 [51.9, 69.7], MD: 0.5 [-0.7, 1.5]). Stimulus levels were defined by a common energy scale (luminance  $\times$  area  $\times$  duration) and equated across stimuli. Threshold and RV were derived from psychometric functions following a 3-step sampling process. DS was calculated as the difference between measured threshold and that predicted for an age-matched control. SNR was calculated as DS/RV.

**Results:** Compared to GIII, mean DS (log Energy) was higher in AMS16 (+0.28) and AMS200 (+0.15), but lower in GV (-0.19). RV was lowest for GV in early damage, but more uniform with defect depth for AMS than LMS. Compared to GIII, SNR was significantly higher for AMS16 ( $1.59 \pm 0.40$ ,  $p < 0.0001$ ) and AMS200 ( $0.52 \pm 0.23$ ,  $p = 0.02$ ), and non-significantly lower for GV ( $-0.33 \pm 0.23$ ,  $p = 0.15$ ).

**Conclusions:** AMS, designed to exploit altered spatial summation, have higher DS, more uniform noise, and higher SNR than conventional LMS. AMS16, which also exploits altered temporal summation, yields additional SNR compared to AMS200. Despite low RV, GV had the smallest SNR.

# Evaluating the impact of simulated peripheral refractive errors on kinematic parameters associated with activities of daily living

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*Anglia Ruskin University*

**Purpose:** Cataract is the leading cause of blindness globally, and the second leading cause of moderate to severe visual impairment. The intraocular lens inserted during cataract surgery may cause aberrations that affect vision, causing blurring to the peripheral field. These peripheral refractive errors may negatively impact upon activities of daily living (ADLs), in particular mobility, obstacle crossing and visual search.

**Methods:** ADLs (turning a key in a lock, grasping and moving an object, and crossing an obstacle) were completed with spectacles produced as bespoke items for the purpose of this research to simulate peripheral refractive errors that may be experienced after cataract surgery. A ten-camera motion capture system was used to record the movement for each trial and relevant kinematic variables were extracted for analysis.

**Results:** Peripheral refractive errors affect kinematic parameters associated with ADLs - the movement is more cautious when completed with simulated aberrations than without. The participants take longer to complete the tasks with simulated refractive errors, and plan their approach to ensure that they safely complete the task, for example lifting their wrists more when moving objects (+17.5%), or allowing for a higher foot clearance when stepping over obstacles (+7.2% lead foot, +13.6% trail foot).

**Conclusions:** Simulated peripheral refractive errors cause changes to how participants approach ADLs, suggesting that this is also likely to occur post-surgery for cataract patients. Therefore, education and rehabilitation strategies that mitigate risk of injury or falling in the period of adjustment post-surgery would be indicated for this population group.

# Barriers and facilitators to accessing exercise facilities for people with visual impairment: a systematic review.

Clare Strongman, Leah Njenje, Brandon Boyer, Shahina Pardhan

*Anglia Ruskin University*

**Purpose:** Regular physical activity reduces the risk of several chronic diseases including cardiovascular disease, diabetes, and depression. Physical activity improves health and mental well-being, but visually impaired people are twice as likely to be inactive than non-visually impaired people, which can lead to poor healthcare outcomes. This review aims to synthesise the research exploring barriers and facilitators to accessing exercise facilities for people with visual impairments.

**Methods:** An electronic keyword search was performed on four databases (PubMed, Web of Science, PsycINFO, SPORTDiscus) to identify relevant studies for this systematic review. No restrictions were placed on date of publication or participant demographics. Exclusion criteria were then applied by two researchers, and study quality was evaluated using the Critical Appraisal Skills Programme checklists. A narrative synthesis was performed to identify patterns in the data.

**Results:** 6514 papers were found following the keyword search. After removing duplicates and applying the exclusion criteria, 14 papers were identified as relevant to this review. A range of barriers and facilitators were identified that affect access to leisure and sport facilities for people with visual impairment.

**Conclusions:** The findings from this study can provide recommendations to staff of sports facilities to improve the access and safety of people with visual impairment. Making sports facilities more accessible should encourage uptake and adherence in physical activity for this population group which potentially reduces the burden on healthcare services. Further, this review provides useful information that may affect policy changes for the UK in terms of equality, inclusivity and diversity.

# Exploring clinicians' training needs relating to accessibility of UK healthcare services by adults with visual impairment.

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*Anglia Ruskin University*

**Purpose:** People with visual impairment (VI) have great difficulty in accessing services such as health-care, yet despite this, limited up-to-date research exists on initiatives to tackle this lack of accessibility. This research aims to foreground the service user's voice and identify potential gaps in training and educational resources provided for practitioners and trainees that could improve the experiences of people with VI.

**Methods:** Focus groups were used to gather data on lived experience of people with VI. The focus groups were recorded and transcribed verbatim for analysis, and themes from the discussion were extracted via reflexive thematic analysis. The themes identified were used to create composite vignettes and story stems which were presented to medical students and practitioners to allow them to reflect on their awareness of potential issues faced by people with VI.

**Results:** Overarching themes identified in the focus groups related to the person with VI feeling invisible, practitioners "fire-fighting", assumptions being made about (dis)ability, and inaccessibility of information. Practitioners' responses to composite stories suggest that training on being empathetic, recognising difference and developing strategies to become more inclusive would further equip them with skills to help them be more effective when dealing with people with VI.

**Conclusions:** Using participants' voices to generate stories creates an evocative and engaging method to explore accessibility and access to healthcare services by people with VI. Identifying potential gaps in training allows refinement of the curriculum to ensure practitioners are confident and effective in dealing with visually impaired patients.

# Exploring low luminance visual acuity and the Moorfields Acuity Chart as outcome measures in inherited retinal disease

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**Introduction:** Standard visual acuity (VA) is insensitive to subtle retinal disease changes. Low luminance VA has grown in popularity as an alternative acuity measure, showing greater sensitivity to central retinal changes. The Moorfields Acuity Chart (MAC) has been designed, using resolution acuity principles, to be a more repeatable VA test for patients with age-related macular degeneration. The study explores these three acuity tests in a mixed cohort of patients with inherited retinal disease.

**Methods:** Participants were recruited as part of the Visual Function in Retinal Degeneration Study (Ethics Reference 20/WM/0283). Standard VA was obtained using the Early Treatment Diabetic Retinopathy Study (ETDRS) chart placed 4 meters and room lights off. Low luminance VA was obtained using the same set up with the addition of a 2.0 neutral density filter. MAC-VA followed, under the same conditions but using standard clinic room lighting.

**Results:** Thirty-six control participants (mean age 29.4 [standard deviation 14.8] years) and 35 patients (mean age 37.4 [standard deviation 17] years) completed testing. Both low luminance VA and MAC-VA were significantly reduced compared to standard VA in both groups (Linear mixed model:  $p < 0.001$ ). However, MAC-VA showed a narrower range of results. Bland Altman repeatability (RE only) revealed marginally lower coefficients of repeatability with MAC-VA (RE  $\pm 4.1$ , LE  $\pm 4.7$ ) compared to standard VA (RE  $\pm 6.0$ , LE  $\pm 6.2$ ) and low luminance VA (RE  $\pm 6.1$ , LE  $\pm 5.7$ ).

**Conclusion:** MAC-VA may be a slightly more repeatable marker in patients with inherited retinal disease, however, it may be limited by floor and ceiling effects.

# Does pupil dilation impact anterior segment OCT measurements during accommodation?

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**PURPOSE:** Advances in anterior segment (AS) OCT have enabled in-vivo investigation of the still-disputed structural changes enabling accommodation. However, pupil constriction limits the view. This study investigated structural dynamics during accommodation and the influence of sympathomimetic pupil dilation on measurements.

**METHODS:** CASIA2 AS-OCT imaging was conducted before and after Phenylephrine 2.5% instillation in the right eyes of fully corrected individuals ( $n=46$ , mean age= $22.8 \pm 3.4$  years, SER=  $-7.50$  to  $+7.88$ D) across five accommodative demands (0,2,3,4,6D) stimulated using an internal coaxial target. Simultaneously, the accommodative response of the contralateral eye was measured with PowerRefractor3 using a bespoke mirror setup. Results were analysed using linear mixed-effect model analysis.

**RESULTS:** With accommodation lens thickness (LT) and anterior segment length (ASL) increased significantly while anterior chamber depth (ACD), lens diameter (LD), and anterior and posterior lens radius of curvature (ALRC and PLRC) decreased significantly (all  $p < 0.001$ ). Accommodative changes in LT and ASL were significantly associated with the level of SER. The accommodation-related structural changes through dilated (mean= $7.02 \pm 0.6$ mm) and un-dilated (mean= $5.73 \pm 3.4$ mm) pupils were the same except for PLRC ( $\beta=0.029$ ,  $p=0.003$ ) and LD ( $\beta=0.029$ ,  $p=0.001$ ). The corresponding functional response was similar under both pupil conditions ( $\beta=-0.05$ ,  $p=0.99$ ).

**CONCLUSIONS:** Phenylephrine pupil dilation does not affect structural lens measurements during accommodation except for PLRC and LD. The exceptions may result from the circle-fitting algorithm used to estimate these parameters which relies on the lens area visualised through the pupil. However, dilation is unnecessary to investigate LT and ASL changes during accommodation with CASIA2 AS-OCT.

# Can primary care Optometry reduce the impact of allergic eye disease in children?

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**Purpose:** Chronic Allergic Eye Disease (AED) in children can lead to the development of corneal complications, such as keratoconus. There is limited data on the prevalence of AED in children with systemic severe allergic conditions. This study aimed to investigate a group of optometrists and pharmacists on their opinions, assessment and management of AED. In addition, a group of parents of children who carry an adrenaline autoinjector (AAI) were recruited to investigate the severity of any ocular symptoms present. The study also researched whether the treatment prescribed and advice given were in line with current guidance.

**Methods:** Online qualitative questionnaires were developed and provided to Optometrists, Pharmacists and parents.

**Results:** The results demonstrated optometrists are statistically significantly more likely ( $p < 0.05$ ) to investigate AED if patients are symptomatic. Both optometrists and pharmacists would treat with conventional therapy with few recommending a dual therapy medication. Pharmacists reported a low level of confidence in managing this population, with little training, equipment or resources. The parental group was provided with limited advice on receipt of their AAI, however, 65.4% of children who had an AAI, reported having ocular symptoms.

**Conclusions:** Optometrists were found to be best suited to manage and treat AED, with IP optometrists having more confidence to manage and treat with POM medications. Better CPD is needed to inform optometrists of the safety and efficacy of dual therapy medications. Pharmacists, and other healthcare professionals would benefit from an infographic to inform them of best practice management for AED.

# Quantifying Visual Sensitivity to Emotional Facial Expressions

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**Purpose:** Facial expressions provide insight into an individual's emotional state, and are a critical component of non-verbal communication.<sup>1</sup> Using novel, digital stimuli which enable precise control of facial expression intensity, we compared visual sensitivity to six emotional facial expressions.

**Methods:** On each trial, two face images were presented one-after-the-other (200ms each). One face (target) portrayed one of six emotional facial expressions at a specific level of intensity, whilst the other was always neutral (distracter). Twenty (ten female) participants (mean age 31.2 years [SD ±5.75]) indicated which interval contained the expressive face. An adaptive procedure (Quest) manipulated facial expression intensity to estimate facial expression discrimination thresholds.

**Results:** Discrimination thresholds depended strongly upon emotion (Repeated measures ANOVA:  $F_{5,72} = 63.50$ ;  $p < 0.001$ ). The mean threshold for anger (29.7%) was 2.8 times higher than for happiness (10.6%). Post-hoc tests revealed that thresholds were significantly higher for sadness, anger and fear, relative to happiness, surprise and disgust (Bonferroni correction;  $p < 0.05$ ). Changing viewing distance by a factor of four had no effect on discrimination thresholds ( $F_{2,6} = 1.27$ ,  $p = 0.35$ ).

**Conclusions:** Human vision is more sensitive to some emotional facial expressions than others. Considering the six emotions that were tested, our data indicate that sensitivity can be categorised into two groups: higher sensitivity for happiness, surprise and disgust; lower sensitivity for sadness, anger and fear. Visual sensitivity to these facial expressions is robust to considerable changes in viewing distance (0.5-2m). These results provide insight into the typical performance of human vision on a task with real-world implications.

# The Management of Myopia in University Students (MoMUS) Study

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*University of Bradford*

**Purpose:** Extensive research has focused on childhood myopia, resulting in a range of management options to slow progression<sup>1,2,3</sup>. However, myopia progression in young adults remains understudied and even less is known about myopia management in this age group<sup>4</sup>. The MoMUS (Management of Myopia in University Students) study aims to address this gap by evaluating the efficacy of MiSight 1-day® lenses in mitigating myopia progression in this population compared to a Proclear Daily control lens.

**Methods:** The MoMUS study is a three-stage investigation designed to evaluate the efficacy of MiSight 1-day® lenses (omafilcon A, CooperVision, Inc.) in slowing myopia progression in young adults. It is a 4-year, dual centre, controlled, single masked (investigator) randomised crossover clinical trial (ClinicalTrials.gov ID NCT05955638).

The primary outcome measures are changes in axial length and cycloplegic autorefraction from baseline. Additionally, the study will assess lens performance, visual quality, choroidal thickness, peripheral refraction, and post treatment outcomes.

Stage 1: establish progression (stage in progress)

Stage 2: crossover trial (stage in progress)

Stage 3: assess post treatment outcomes.

**Results:** To date, 199 participants have undergone initial screening for the MoMUS study and the second screening visits are currently ongoing. Progressing myopes have also been recruited from another completed PhD project.

**Conclusions:** 22 individuals have so far signed up to Stage 2 after exhibiting myopia progression ( $>0.05\text{mm}$ )<sup>5</sup> and subsequently been randomised to receive either MiSight 1-day® or Proclear Daily control lenses, initiating the first year of the intervention stage.

This research is supported by CooperVision, Inc.

# A preliminary study using digital image manipulation to create accurate depictions of vision in glaucoma

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**PURPOSE:** Studies suggest common depictions of tunnel vision in glaucoma are inaccurate, yet understanding of visual experiences in glaucoma is limited. This study aims to accurately reproduce visual perceptions of typical people with glaucoma to better understand visual symptoms.

**METHODS:** Four participants were tested with asymmetric glaucoma severity with mean deviation (median [IQR] -13.02 [-12.10, -15.97]) in the worse eye (median [IQR] age 67 [59, 79]). Participants viewed images monocularly, alternating between eyes, maintaining fixation on a central marker. Participants described inter-eye perceptual differences while a digital artist iteratively modified the image presented to the better eye until it appeared identical to the unmodified image viewed with the worse eye. This was repeated for four images – a checkerboard, and three everyday scenes [1].

**RESULTS:** Excluding one for poor fixation, we report preliminary data from three participants successfully completing the task, allowing spatially-localised image modifications. Eleven modified images reflecting participants' visual perceptions were produced, requiring a series of modifications: reduced brightness, desaturation, blur, filling-in, reduced vibrancy, and increased opacity. Areas of modification reflected superior and inferior defects. One participant reported difficulty focusing on the checkerboard image and saw 'no difference' between eyes, discarding one image.

**CONCLUSIONS:** The visual representations produced showed symptomatic differences displaying a range of spatially-localised changes. Although we recognise this is not a representation of all glaucomatous visual symptoms, these findings support prior research that glaucoma patients do not report tunnel vision [2, 3]. We will recruit 20 participants to study a diverse range of glaucomatous visual changes.