Vision Research In Optometry

Jeffrey J. Walline, OD PhD

Disclosure

- Bausch + Lomb
  - Research materials
The Ohio State University College of Optometry

Faculty
- 20 tenure track
- 12 clinical track
- 1 research track

Graduate Students
- 8 PhD
- 38 Combined OD/MS

Facilities
- New clinic
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Research
- Starling-Loving and Fry Bridge

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Facilities
- Wildermuth Optometric Research Clinic
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Research
- Basic science laboratory

![Research Images](image1.png)

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Research
- Proposals

![Research Proposals Graph](image2.png)

- Non-Fed Proposals
- Fed Proposals
The Ohio State University College of Optometry

Research

- Funding

<table>
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<tr>
<th>Year</th>
<th>Federal</th>
<th>Industry</th>
<th>Other</th>
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Research

- Publications

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<th>Year</th>
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<td>2020</td>
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## The Ohio State University College of Optometry

### Research
- Top 200 h-index among optometrists

<table>
<thead>
<tr>
<th>Rank</th>
<th>Name</th>
<th>h-index</th>
<th>Papers</th>
<th>Citations</th>
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<tbody>
<tr>
<td>7</td>
<td>Karla Zadnik</td>
<td>56</td>
<td>213</td>
<td>10394</td>
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<td>20</td>
<td>Donald Mutti</td>
<td>47</td>
<td>158</td>
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<td>107</td>
<td>Marjean Kulp</td>
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<td>122</td>
<td>Joseph Barr</td>
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<td>128</td>
<td>Jeffrey Walline</td>
<td>26</td>
<td>62</td>
<td>2022</td>
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<td>163</td>
<td>Richard Hill</td>
<td>24</td>
<td>282</td>
<td>3671</td>
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<td>164</td>
<td>Stacey Choi</td>
<td>23</td>
<td>63</td>
<td>2152</td>
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</table>

### Types of research
- Clinical: 59%
- Translational: 8%
- Basic: 31%
- Training: 2%
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Research
- Interdisciplinary

Clinical Research
- Refractive error
- Convergence insufficiency
- Amblyopia
- Keratoconus
- Down syndrome
- Traumatic brain injury
- Low vision rehabilitation
Translational Research
- Adaptive optics
- ipRGC
- Pupil function

Basic Research
- Corneal wound healing
- Embryonic development
- Cataract prevention

Courtesy of Heather Chandler

Knockout MG53 expression
Normal MG53
Overexpress MG53 expression

Courtesy of TJ Plageman
Public Health Research

- Determinants of vision impairment

https://www.cdc.gov/visionhealth/data/state-profiles/index.htm

Myopia
Myopia

Myopia

$8,200,000,000

From: visionimpactinstitute.org/research/direct-costs-of-myopia-in-singapore

Odd Ratio
Myopia (D)

1.00 to 2.99
3.00 to 4.99
5.00 to 6.99
7.00 to 8.99
≥ 9.00

Flitcroft DI. Prog Retin Eye Res 2012;31:622-60
Myopia

Prevalence of Myopic Maculopathy

Every 1 D less myopic, 40% less chance of myopic maculopathy


Myopia

Number of myopic parents: None One Two

Chance of Becoming Myopic

**Myopia**


Effect of High Add Power, Medium Add Power, or Single-Vision Contact Lenses on Myopia Progression in Children
The BLINK Randomized Clinical Trial

Myopia

Change from baseline (mm)

0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

0 1 2 3

Single Vision
+1.50 D add
+2.50 D add

Myopia

CHAMP

CHAPERONE

iVERG

INNOVATION in VISION and EYE CARE RESEARCH GROUP
Myopia

Myopia

- Every year younger at onset
  - -0.86 D more myopic
  - 2.86 X more likely to be high myope


Myopia

- Leading causes of blindness >65 years worldwide
  - Diabetic retinopathy
  - Macular degeneration
  - Myopic maculopathy
  - Cataract
  - Retinal disorders
  - Corneal opacity
Myopia

An ounce of prevention is worth a pound of cure.

Opportunities
Opportunities

Thank you!
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Clinical Research

- Vision in Preschoolers-Hyperopia in Preschoolers (VIP-HIP) Study

**Uncorrected Hyperopia and Preschool Early Literacy**

Results of the Vision in Preschoolers—Hyperopia in Preschoolers (VIP-HIP) Study

<table>
<thead>
<tr>
<th></th>
<th>Emmetropic (n = 246)</th>
<th>Hyperopic (3–6 D) (n = 244)</th>
<th>Adjusted*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TOEFL Score Mean</td>
<td>Hyperopic Mean</td>
<td>Difference (95% CI) P</td>
</tr>
<tr>
<td>Total</td>
<td>89.4</td>
<td>83.5</td>
<td>-4.3 (-7.7 to -0.9) 0.01</td>
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<tr>
<td>Print Knowledge</td>
<td>22.9</td>
<td>19.7</td>
<td>-3.2 (-4.1 to -2.6) 0.007</td>
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<tr>
<td>Vocabulary</td>
<td>51.2</td>
<td>48.9</td>
<td>-2.3 (-3.4 to -1.3) 0.07</td>
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<tr>
<td>Phonological Awareness</td>
<td>15.4</td>
<td>14.9</td>
<td>-0.3 (-1.1 to 0.4) 0.39</td>
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</table>

- Collaborative Longitudinal Evaluation of Keratoconus (CLEK) Study

- 20% of keratoconus patients will experience a scar after 8 years
- Scarring is related to steep corneal curvature, contact lens wear, corneal staining, younger than 20 years
Clinical Research

- Vision in Preschoolers (VIP) Study

<table>
<thead>
<tr>
<th>Screening Tests</th>
<th>Sensitivity (95% CI)</th>
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<tr>
<td>NCR</td>
<td>0.88 (0.81, 0.95)</td>
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<tr>
<td>SureSight</td>
<td>0.80 (0.72, 0.88)</td>
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<tr>
<td>Retinomax Y2</td>
<td>0.78 (0.69, 0.87)</td>
</tr>
<tr>
<td>Retinomax Y1</td>
<td>0.77 (0.67, 0.87)</td>
</tr>
<tr>
<td>Lea VA</td>
<td>0.65 (0.54, 0.76)</td>
</tr>
<tr>
<td>MTI</td>
<td>0.63 (0.53, 0.73)</td>
</tr>
<tr>
<td>Screen</td>
<td>0.62 (0.52, 0.72)</td>
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<tr>
<td>Stereo Smile II</td>
<td>0.61 (0.51, 0.71)</td>
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<tr>
<td>Power</td>
<td>0.57 (0.47, 0.67)</td>
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<tr>
<td>HOTIV VA</td>
<td>0.52 (0.41, 0.63)</td>
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<tr>
<td>Random Dot E</td>
<td>0.28 (0.18, 0.38)</td>
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<tr>
<td>Cover-uncover</td>
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</table>

- Collaborative Longitudinal Evaluation of Ethnicity and Refractive Error (CLEERE) Study
Clinical Research
- Convergence Insufficiency Treatment Trial (CITT)

Translational Research
- Doble and Choi Laboratory
Basic Science Research

- Plageman Laboratory

Basic Science Research

- Chandler Laboratory