



# Vision Research In Optometry

Jeffrey J. Walline, OD PhD



The Ohio State University College of Optometry

## 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

## The Ohio State University College of Optometry

### Facilities

- New clinic



### The Ohio State University College of Optometry

#### Research

- Starling-Loving and Fry Bridge



### The Ohio State University College of Optometry

#### Facilities

- Wildermuth Optometric Research Clinic

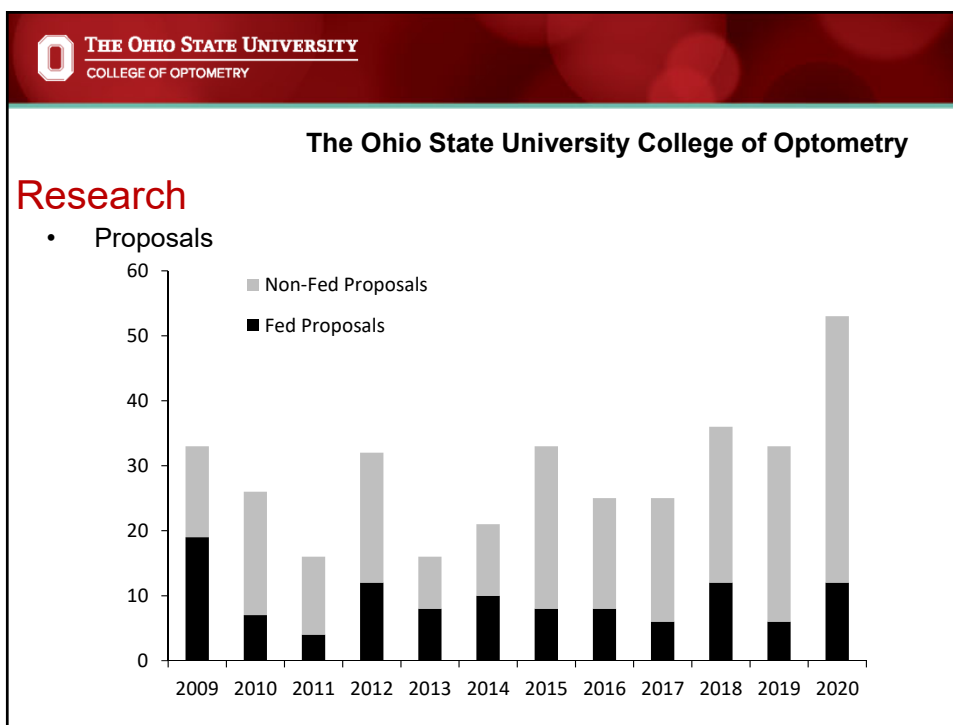


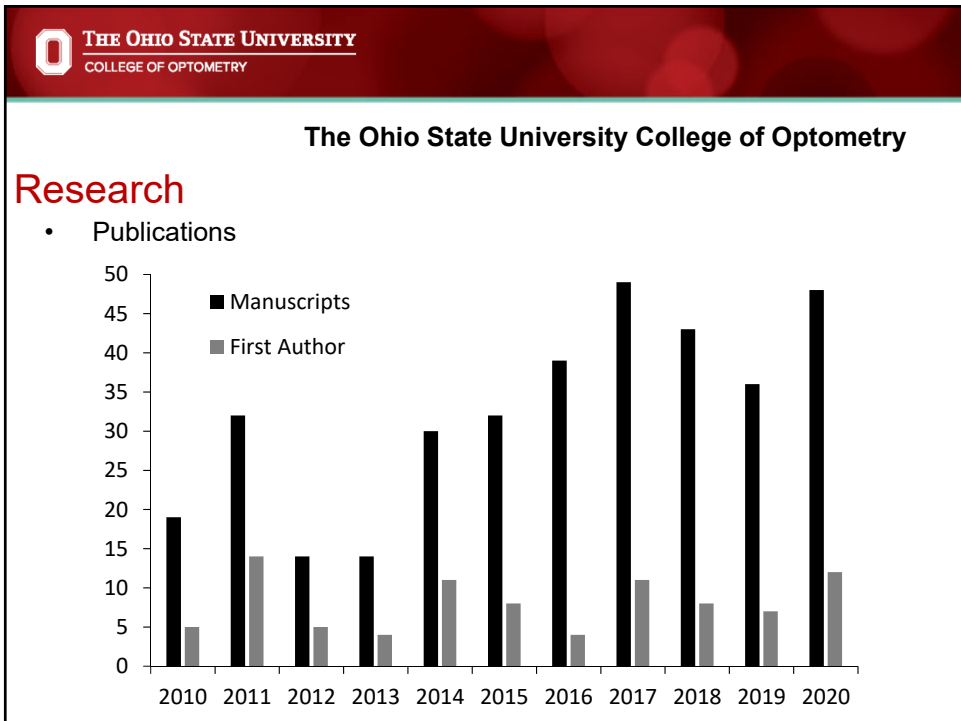
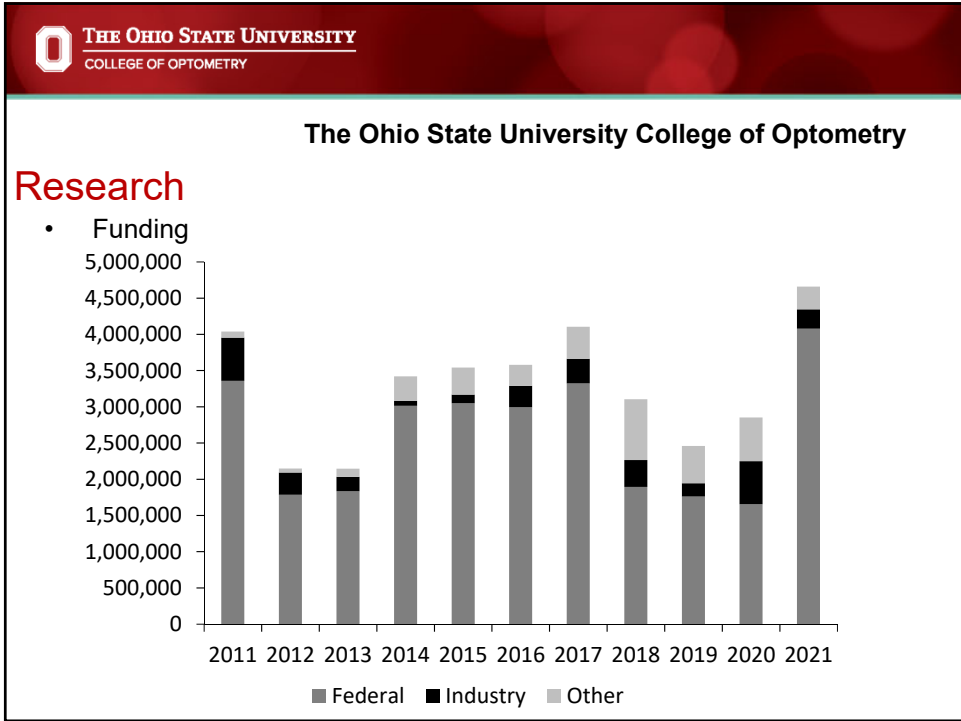
**THE OHIO STATE UNIVERSITY**  
COLLEGE OF OPTOMETRY

**The Ohio State University College of Optometry**

**Research**

- Basic science laboratory





### The Ohio State University College of Optometry

## Research

- Top 200 h-index among optometrists

Rank	Name	h-index	Papers	Citations
7	Karla Zadnik	56	213	10394
20	Donald Mutti	47	158	7756
107	Marjean Kulp	28	82	2571
122	Joseph Barr	27	90	2610
128	Jeffrey Walline	26	62	2022
163	Richard Hill	24	282	3671
164	Stacey Choi	23	63	2152

### The Ohio State University College of Optometry

## Research

- Types of research

Type	Percent
Clinical	59
Translational	8
Basic	31
Training	2

**THE OHIO STATE UNIVERSITY**  
COLLEGE OF OPTOMETRY

**The Ohio State University College of Optometry**

**Research**

- Interdisciplinary

**THE OHIO STATE UNIVERSITY**  
COLLEGE OF OPTOMETRY

**The Ohio State University College of Optometry**

**Clinical Research**

- Refractive error
- Convergence insufficiency
- Amblyopia
- Keratoconus
- Down syndrome
- Traumatic brain injury
- Low vision rehabilitation

**Bifocal & Atropine in Myopia Study**

**BLIMP**  
Bifocal Lens Inhibition of Myopia Progression Study

**GLEK**

**BLINK2**  
Bifocal Lenses In Nearsighted Kids 2

**GLEERE**

**blink**  
Bifocal Lenses In Nearsighted Kids

**CRAYON**  
The Corneal Reshaping And Yearly Observation of Nearsightedness Pilot Study

**VIP**

**ACHIEVE**  
Adolescent and Child Health Initiative to Encourage Vision Empowerment

**CLIP**  
contact lenses in pediatrics

**CAKE**  
Children's Attitudes about Kids with Eyeglasses

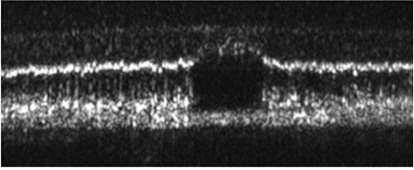
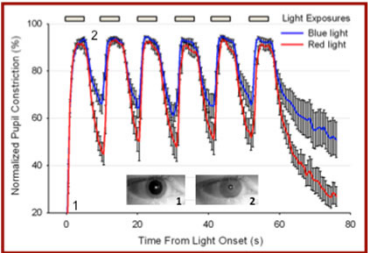
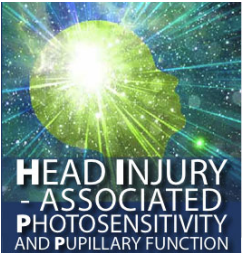
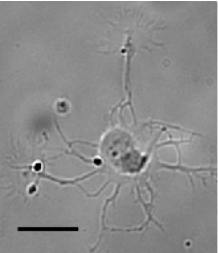
**COOKIE**  
Contact Contact Orthokeratology Study

**THE OHIO STATE UNIVERSITY**  
COLLEGE OF OPTOMETRY

The Ohio State University College of Optometry

### Translational Research

- Adaptive optics
- ipRGC
- Pupil function

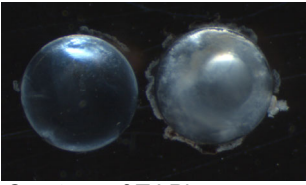





**THE OHIO STATE UNIVERSITY**  
COLLEGE OF OPTOMETRY

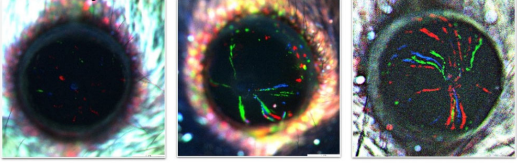
The Ohio State University College of Optometry

### Basic Research

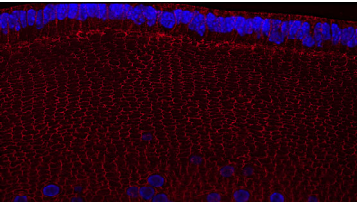
- Corneal wound healing
- Embryonic development
- Cataract prevention



*Courtesy of Heather Chandler*      *Courtesy of TJ Plageman*



Knockout MG53 expression      Normal MG53 expression      Overexpress MG53 expression



*Courtesy of TJ Plageman*



**THE OHIO STATE UNIVERSITY**  
COLLEGE OF OPTOMETRY

The Ohio State University College of Optometry

### Public Health Research

- Determinants of vision impairment

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

**THE OHIO STATE UNIVERSITY**  
COLLEGE OF OPTOMETRY

The Ohio State University College of Optometry

### Myopia

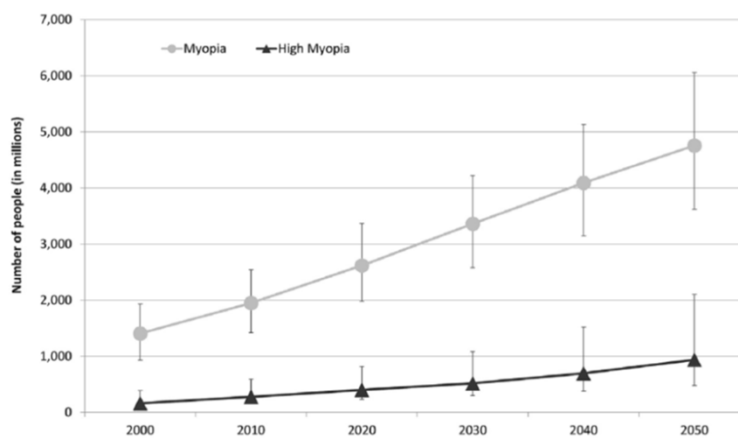
The Ohio State University College of Optometry

Myopia



The Ohio State University College of Optometry

Myopia



Holden BA, et al. Ophthalmol 2016;123:1036-42

**THE OHIO STATE UNIVERSITY**  
COLLEGE OF OPTOMETRY

**The Ohio State University College of Optometry**

**Myopia**

**\$8,200,000,000**

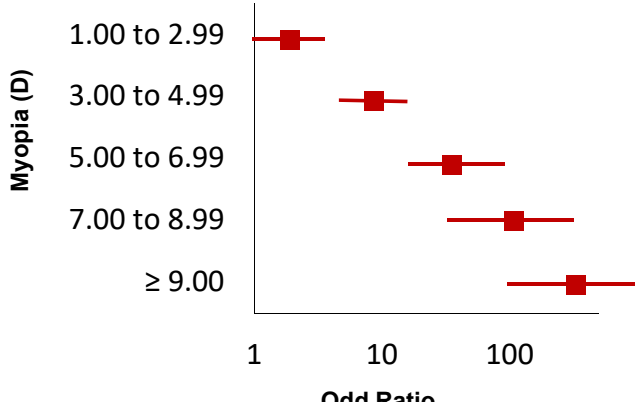


From: [visionimpactinstitute.org/research/direct-costs-of-myopia-in-singapore](http://visionimpactinstitute.org/research/direct-costs-of-myopia-in-singapore)

**THE OHIO STATE UNIVERSITY**  
COLLEGE OF OPTOMETRY

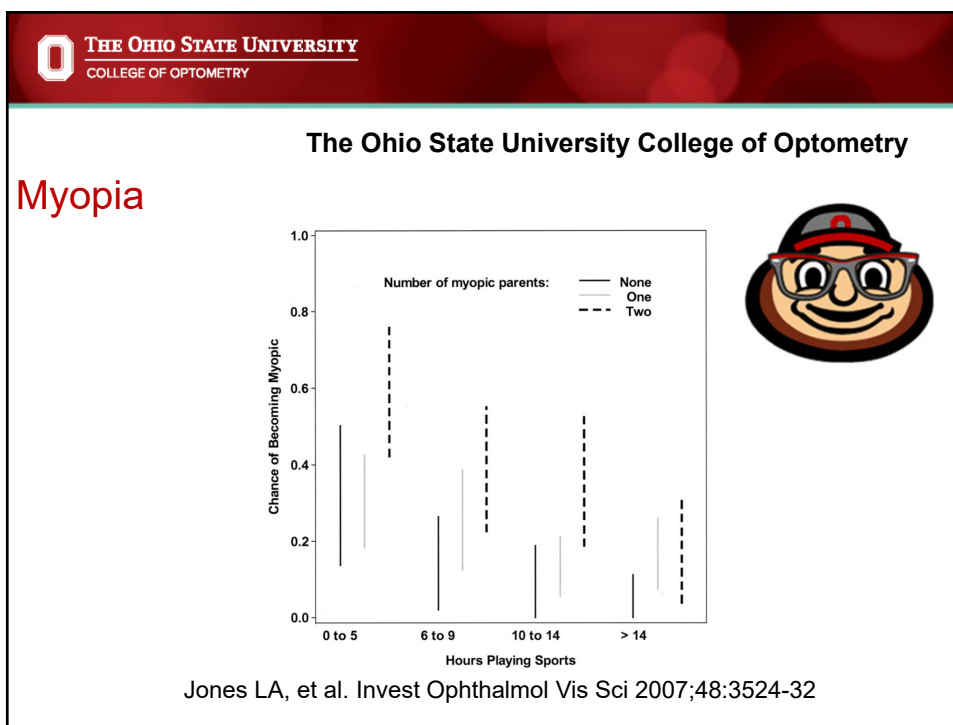
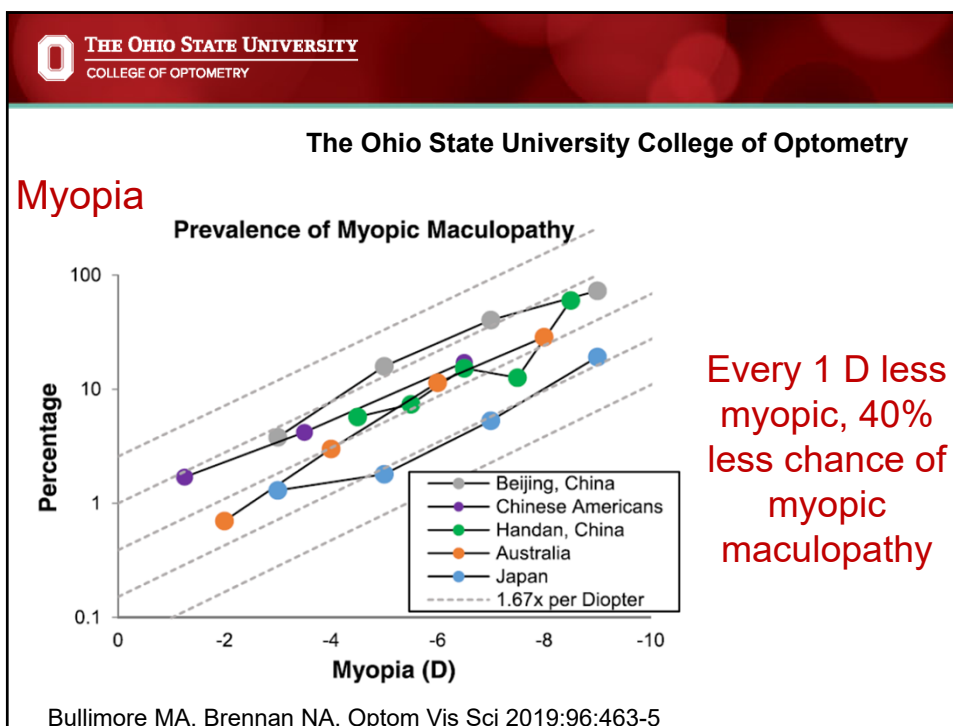
**The Ohio State University College of Optometry**

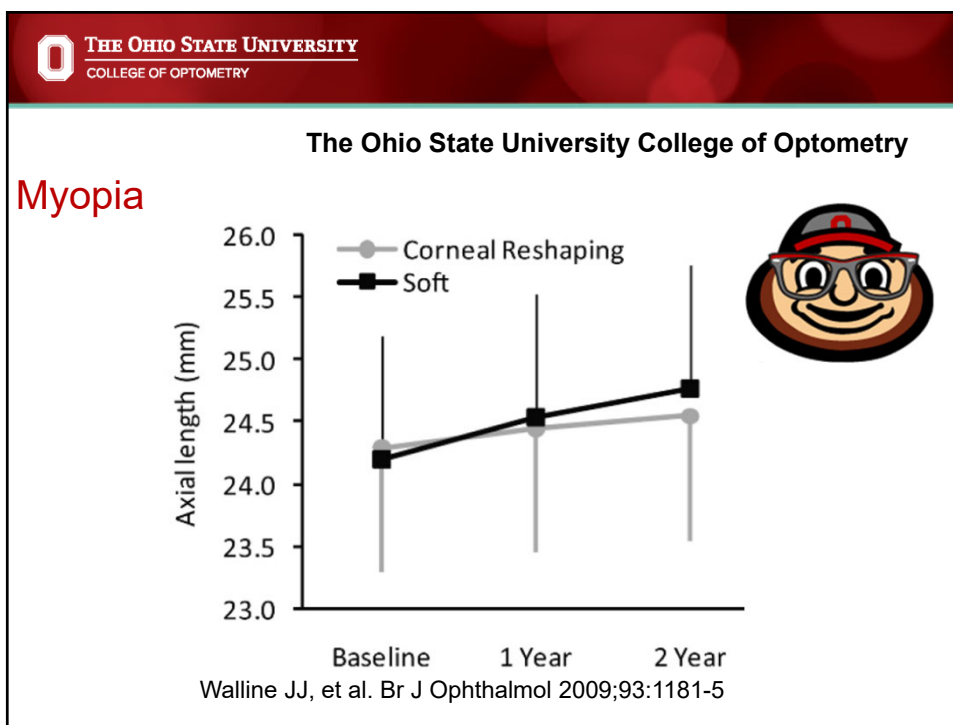
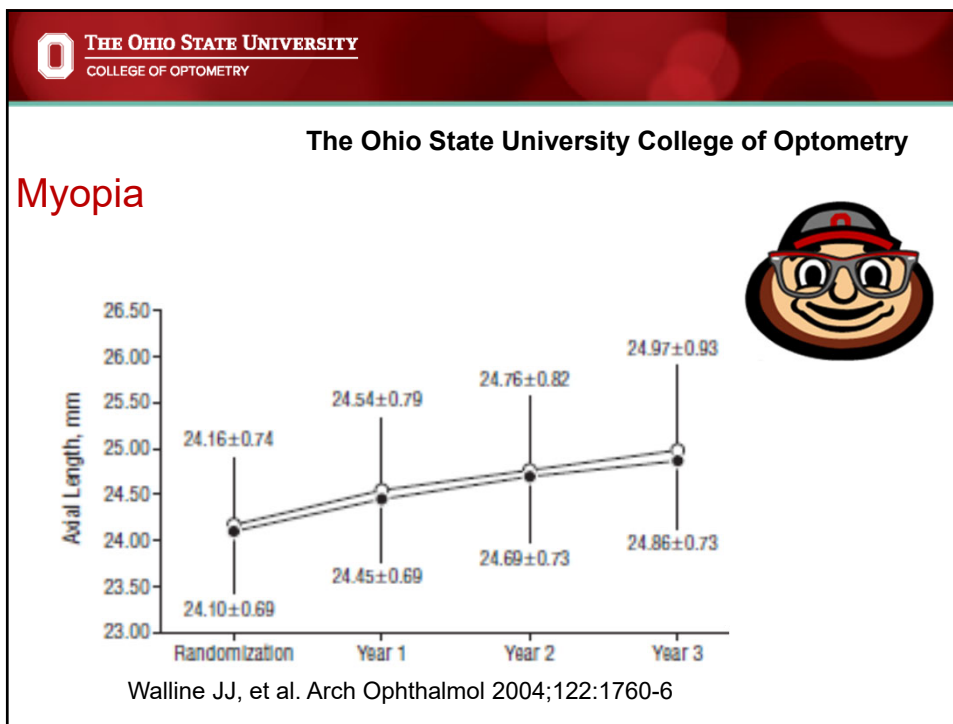
**Myopia**

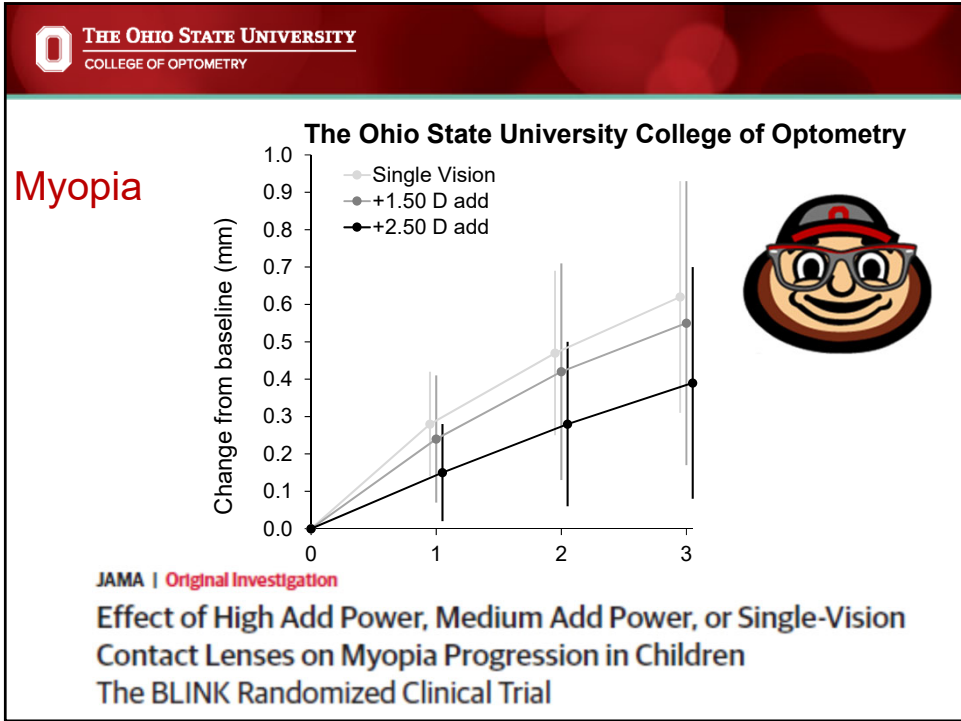


Myopia (D)	Approximate Odds Ratio
1.00 to 2.99	~2.5
3.00 to 4.99	~8.0
5.00 to 6.99	~25.0
7.00 to 8.99	~60.0
≥ 9.00	~150.0

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





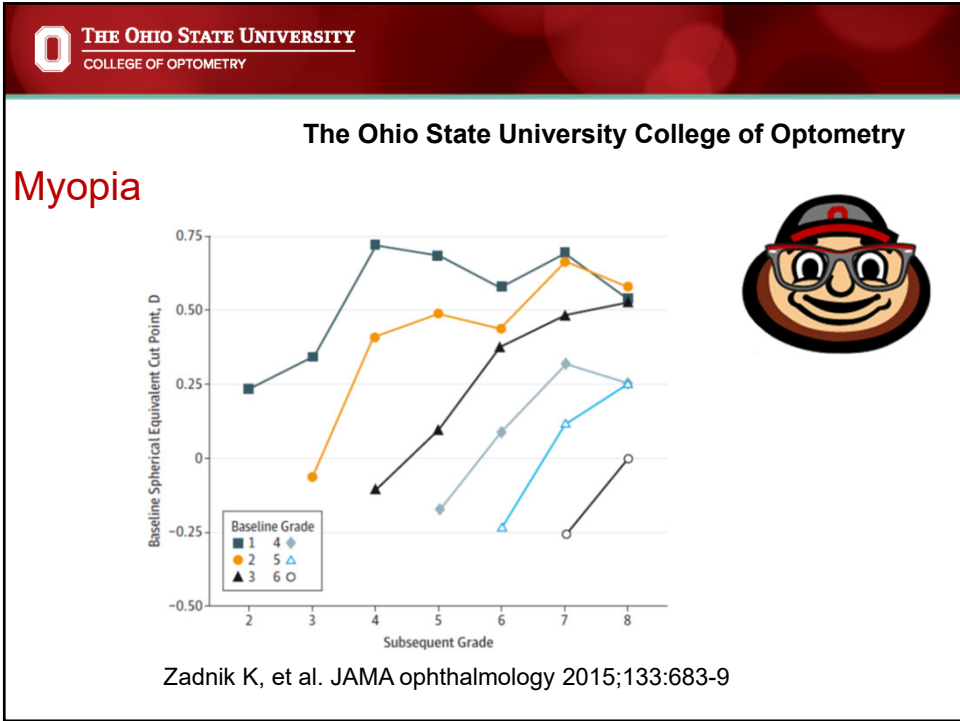


**THE OHIO STATE UNIVERSITY**  
COLLEGE OF OPTOMETRY

### Myopia

#### The Ohio State University College of Optometry

INNOVATION in VISION  
and EYE CARE RESEARCH GROUP



The Ohio State University College of Optometry

## Myopia

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

Chua SY, et al. Ophthalmic Physiol Opt 2016;36:388-94

The Ohio State University College of Optometry

## Myopia

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




 **THE OHIO STATE UNIVERSITY**  
COLLEGE OF OPTOMETRY

The Ohio State University College of Optometry

**Myopia**




An ounce of prevention is worth a pound of cure.

 **THE OHIO STATE UNIVERSITY**  
COLLEGE OF OPTOMETRY

The Ohio State University College of Optometry

**Opportunities**



The Ohio State University College of Optometry

Opportunities



The Ohio State University College of Optometry

Thank you!





**THE OHIO STATE UNIVERSITY**  
COLLEGE OF OPTOMETRY

**The Ohio State University College of Optometry**

## 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*

The VIP-HIP Study Group<sup>®</sup>  
Writing Committee: Marjann Taylor Kulp, OD, MS,<sup>1</sup> Elise Ciner, OD,<sup>2</sup> Maureen Maguire, PhD,<sup>3</sup>  
Bruce Moore, OD,<sup>4</sup> Jill Pentimonti, PhD,<sup>5</sup> Maxwell Pistilli, MS,<sup>6</sup> Lynn Cyert, PhD, OD,<sup>7</sup> T. Rossan Candy, PhD,<sup>7</sup>  
Graham Quinn, MD, MSCE,<sup>8</sup> Gui-shuang Ying, PhD<sup>9</sup>

TOPEL Score	Emmetropic (n = 248)		Hyperopic (3–6 D) (n = 244)		Adjusted*	
	Mean	SD	Mean	SD	Difference (95% CI)	P
Total	89.4	23.5	83.5	22.9	-4.3 (-7.7 to -0.9)	0.01
Print Knowledge	22.9	10.7	19.7	11.3	-2.4 (-4.1 to -0.6)	0.007
Definitional Vocabulary	51.2	11.2	48.9	11.1	-1.6 (-3.4 to 0.3)	0.07
Phonological Awareness	15.4	5.4	14.9	4.8	-0.3 (-1.1 to 0.4)	0.39

**THE OHIO STATE UNIVERSITY**  
COLLEGE OF OPTOMETRY

**The Ohio State University College of Optometry**

## Clinical Research

- 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

**THE OHIO STATE UNIVERSITY**  
COLLEGE OF OPTOMETRY

**The Ohio State University College of Optometry**

### Clinical Research

- Vision in Preschoolers (VIP) Study



Screening tests	Sensitivity (95% CI)*
NCR	.88 (.81, .95)
SureSight	.80 (.72, .88)
Retinomax Y2	.78 (.69, .87)
Retinomax Y1	.77 (.67, .87)
Lea VA	.65 (.54, .76)
MTI	.63 (.53, .73)
iScreen	.62 (.52, .72)
Stereo Smile II	.61 (.51, .71)
Power Refractor	
HOTV VA	.52 (.41, .63)
Random Dot E	.28 (.18, .38)
Cover-uncover	.27 (.17, .37)

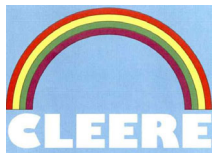
	Nurse Screener	Lay Screener
Retinomax	68	62
SureSight	64	61
Lea Symbols	49	37
Stereo Smile	45	40

**THE OHIO STATE UNIVERSITY**  
COLLEGE OF OPTOMETRY

**The Ohio State University College of Optometry**

### Clinical Research

- Collaborative Longitudinal Evaluation of Ethnicity and Refractive Error (CLEERE) Study



Number of myopic parents: — None, — One, - - - Two

Y-axis: Chance of Becoming Myopic (0.0 to 1.0)

X-axis: Hours Playing Sports (0 to 5, 6 to 9, 10 to 14, > 14)

Y-axis: Baseline Spherical Equivalent Refractive Error, D (-0.50 to 0.75)

X-axis: Subsequent Grade (2 to 8)

Legend: Baseline Grade (1, 2, 3, 4, 5, 6)

**THE OHIO STATE UNIVERSITY**  
COLLEGE OF OPTOMETRY

**The Ohio State University College of Optometry**

### Clinical Research

- Convergence Insufficiency Treatment Trial (CITT)

CI Symptom Survey score	OBVAT (%)	HBPP (%)	HBCVAT (%)	OBPT (%)
0	0	0	0	0
5	25	15	10	5
10	40	25	15	10
15	55	35	25	15
20	65	45	35	20
25	75	55	45	25
30	85	65	55	30
35	90	75	65	35
40	95	85	75	40
45	95	90	85	45
50	95	95	90	50
55	95	95	95	55
60	95	95	95	55

**THE OHIO STATE UNIVERSITY**  
COLLEGE OF OPTOMETRY

**The Ohio State University College of Optometry**

### Translational Research

- Doble and Choi Laboratory



**THE OHIO STATE UNIVERSITY**  
COLLEGE OF OPTOMETRY

**The Ohio State University College of Optometry**

**Basic Science Research**

- Plageman Laboratory



**THE OHIO STATE UNIVERSITY**  
COLLEGE OF OPTOMETRY

**The Ohio State University College of Optometry**

**Basic Science Research**

- Chandler Laboratory