

# **The Boston Child Self-Refraction Study**

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# Prevalent ocular conditions in children

- Significant refractive error
- Amblyopia
- Strabismus
- Eye disease



# Scope of the problem in the developing world

- Huge population of children
- Lack of manpower
- Access to care
- Allocation of resources

# Comparisons in the vision care milieu between developed and developing worlds

- Most people probably think mainly of the differences

# Comparisons in the vision care milieu between developed and developing worlds

- However, perhaps not so different

# Parallels between developed and developing worlds

- Most of the conditions that affect children's vision are universal



# Parallels between developed and developing worlds

- Status of vision care in the US



# Summary

- Conditions affecting children's vision are largely universal
- Barriers to care are similar in the developed and developing worlds

# Child Self-Refracton Study

- Carried out under the auspices of the Center for Vision in the Developing World at Oxford University
- Carried out in Boston and in urban and rural China
- Goal to determine if self-refraction :
  - Can provide visual acuity comparable to a gold standard
  - Can provide refractive correction comparable to a gold standard

# Methods

- Subjects recruited from 38 schools in Boston area
- Van based self refraction and examination
- Self refraction mediated by OD
- Exam by OD masked to results of self refraction

# Subjects

- Total 350 subjects
- 12-18 years of age Mean age: 13.75 years
- Male: 152      Female: 198



# Inclusion - Exclusion Criteria

- Uncorrected VA of 20/40 or worse in one or both eyes
- Best corrected VA of 20/32 or better in both eyes
- Myopia  $\geq -1.00\text{D}$  in one or both eyes,  $\leq -7.75\text{D}$  in both eyes
- $\leq -2.25\text{D}$  astigmatism in both eyes
- No amblyopia or strabismus
- No ocular pathologies

# Visual Acuity

- 98.72% of 700 eyes obtained 20/32 or better visual acuity

# Visual Acuity

- 92.15% of 700 eyes obtained 20/25 or better visual acuity

# Visual Acuity

- Of 350 subjects, only 2 (0.571%) subjects could not get 20/32 or better in their better eye



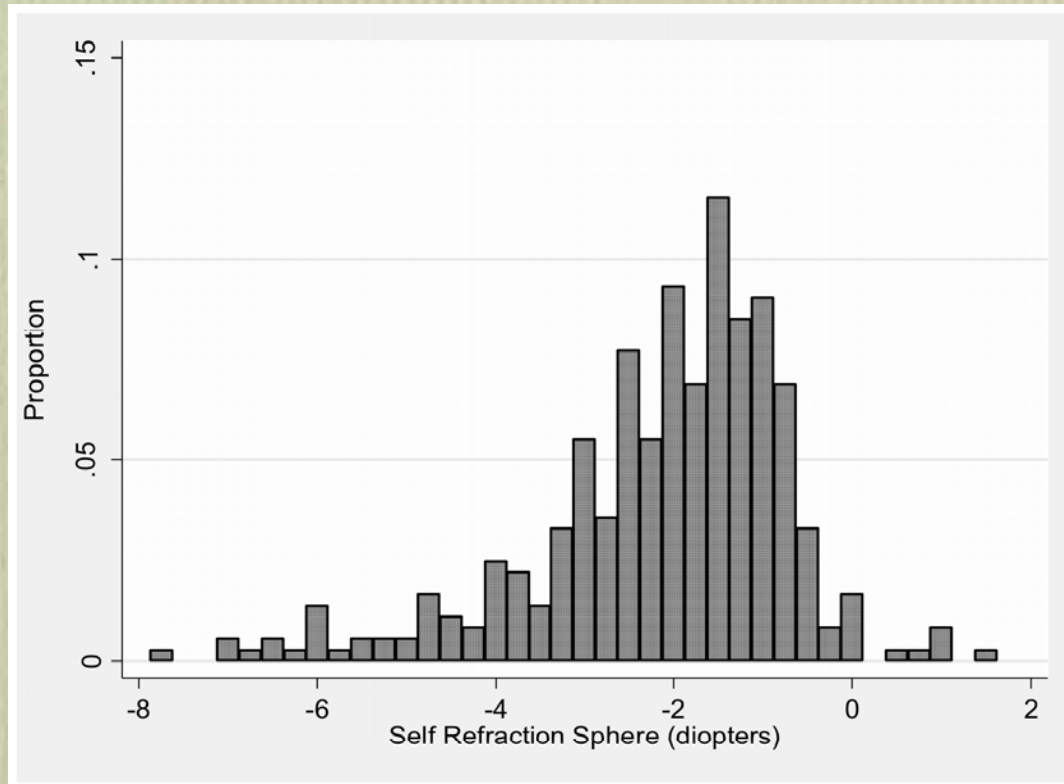
# Visual Acuity

- Only 9 eyes (1.28%) of a total of 700 eyes could not get 20/32 or better acuity

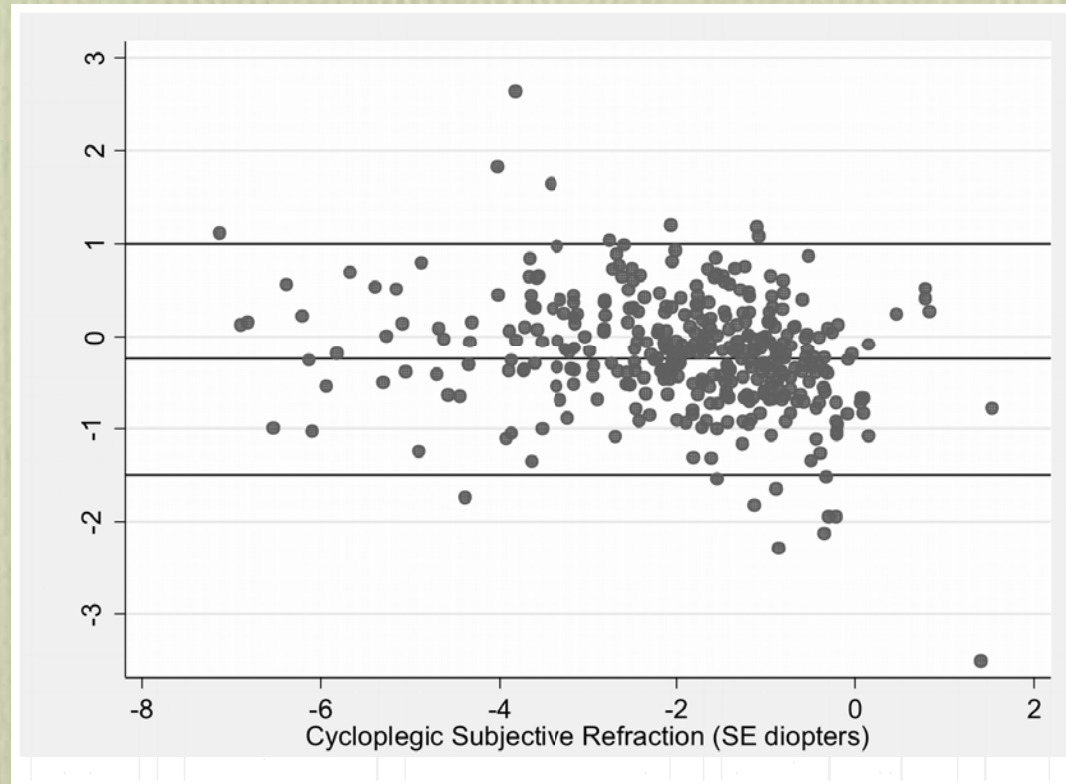
# Refraction Results

- Self-Refraction – Cycloplegic Subjective Refraction:  
Mean: - 0.23 D    Standard deviation: 0.67 D
- Non-cycloplegic Autorefraction – Cycloplegic Subjective Refraction:  
Mean: - 0.20 D    Standard deviation: 0.30 D

Distribution of spherical equivalent refractive error in the right eye for Boston school children as assessed by self-refraction. Negative values indicate myopia and positive values hyperopia.

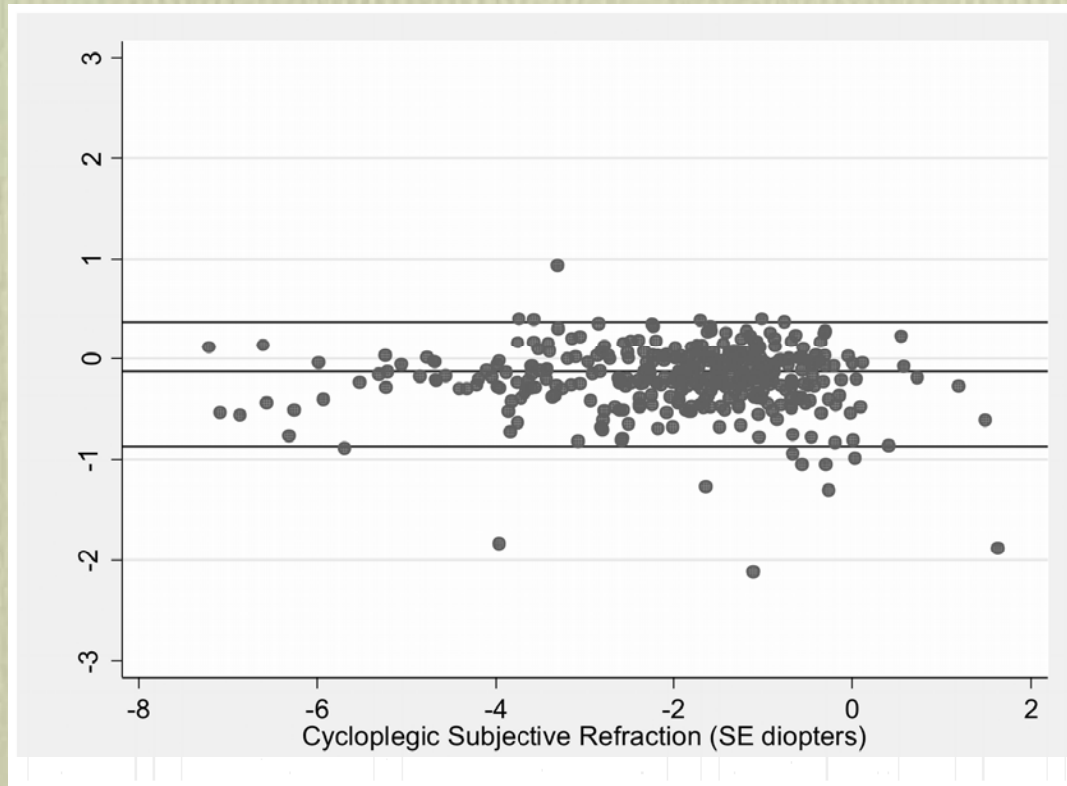


Bland Altman plots comparing cycloplegic subjective refractive error with self-refraction in the right eye. The horizontal lines represent, from top to bottom, the 97.5th percentile, the median and the 2.5th percentile, respectively.

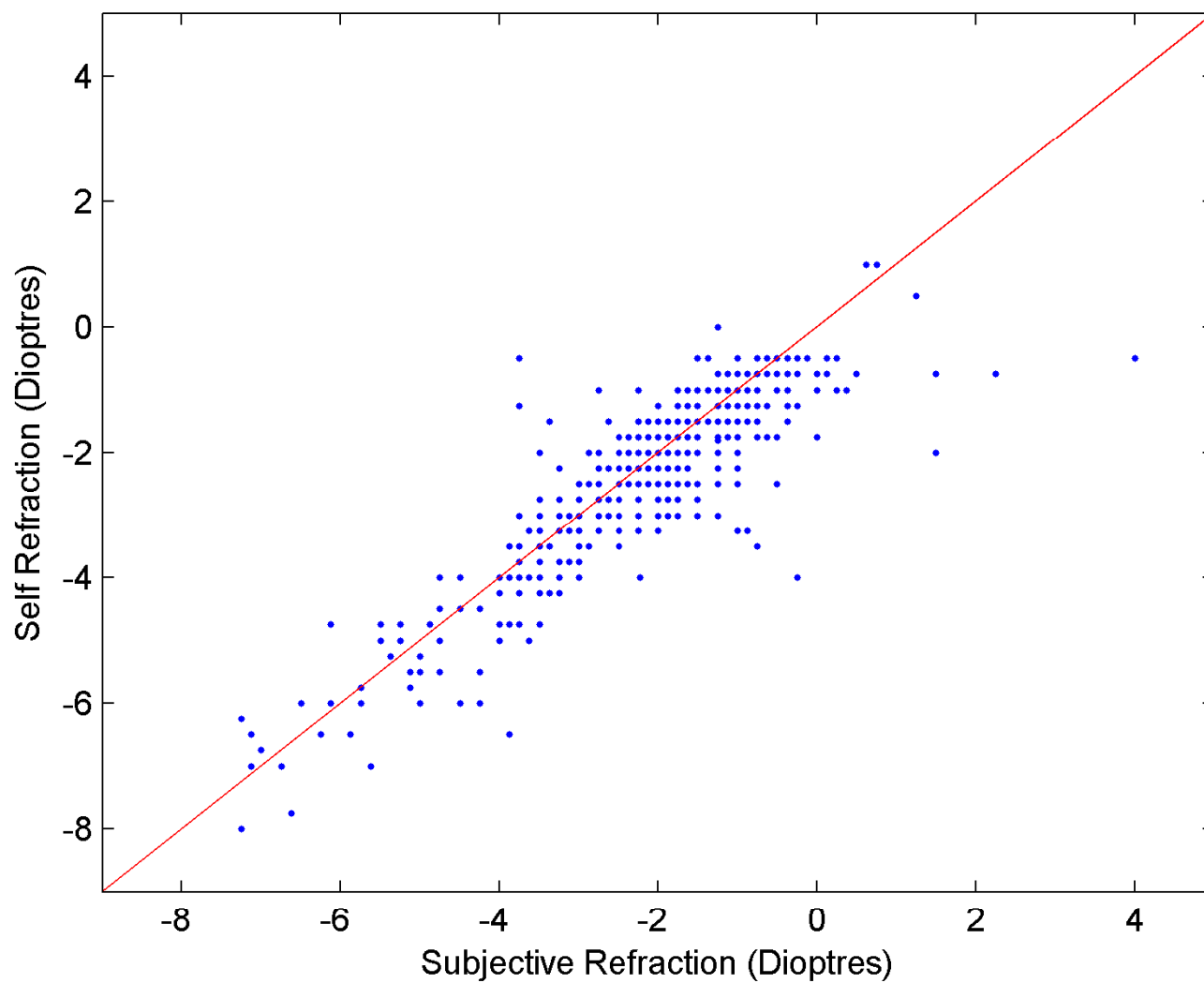




Bland Altman plots comparing cycloplegic subjective refractive error with non-cycloplegic auto-refraction in the right eye. The horizontal lines represent, from top to bottom, the 97.5th percentile, the median and the 2.5th percentile, respectively.



Comparison of Self Refraction with Subjective Refraction



# Visual Acuity Results Discussion

- Almost every subject was able to get very good vision through their self refraction
- Very few eyes were unable to obtain good vision through their self refraction

# Visual Acuity Results Discussion

- Of those 9 eyes not able to obtain 20/32 or better
  - 4 under-minused, 2 over-minused
  - 3 in close refractive agreement but still had reduced acuity
  - None with cyl between -1.25 to -2.25D had 20/40 or worse



# Refraction Results Discussion

- Mean self refraction very close to that of Cycloplegic Subjective Refraction
- Standard deviation, i.e. variation in self refraction quite large

# Refraction Results Discussion

- Why the “scatter”?
- What, if anything, can we do to reduce it?

# The potential role of self refraction

- as a refracting tool

# The potential role of self refraction

- as a treatment tool



# The potential role of self refraction

- as a screening tool

# The potential role of self refraction

- as an early stage in the development of a system of care

# The potential role of self refraction

- as a stimulus to increasing demand by the population to develop a system of vision care

# The potential role of self refraction

- What next??



# Thanks!

