

Does having amblyopia affect school readiness and cognitive performance?

Lisanne A Gitsels^{1-2*}

Mario Cortina-Borja¹

Jugnoo S Rahi¹⁻⁴

1 University College London Great Ormond Street Institute of Child Health

2 Ulverscroft Vision Research Group

3 Great Ormond Street Hospital for Children NHS Foundation Trust

4 UCL Institute of Ophthalmology

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lisanne.gitsels.11@ucl.ac.uk

Background

- Amblyopia (“lazy eye”) is a neurodevelopmental condition resulting in reduced vision, predominantly affecting one eye
- Prevalence of 2-5% of children
- Common causes (these conditions can exist without resulting amblyopia):
 - Unequal refractive errors
 - Strabismus (misalignment of the eyes)
 - Cataracts
- Universal child vision screening is undertaken primarily to detect amblyopia though the value of such screening programmes continues to be debated
- There is limited evidence about the negative impact of amblyopia on the lives of affected individuals - one important purported impact is on educational outcomes



Methods

- **Objective:** determine whether amblyopia is associated with school readiness and early cognitive performance
- **Design:** prospective cohort study
- **Setting:** children born in the UK in 2000-01
- **Participants:** 13,967 children in the Millennium Cohort Study followed-up to age 7 years
- **Exposure of amblyopia status:**
 1. No eye conditions (baseline)
 2. Strabismus alone
 3. Refractive amblyopia
 4. Strabismic or mixed (strabismic + refractive) amblyopia
- **Outcome measures:**
 1. Poor school readiness using Bracken School Readiness Assessment <25th percentile (age 3)
 2. Cognitive tests and age-related trajectories using British Ability Scale II Naming Vocabulary (ages 3 and 5) and Pattern Construction (ages 5 and 7)

Results

Odds of treatment started by age 3 and 5 years among children with amblyopia and/or strabismus

Eye condition	Age 3 Adjusted OR (95%CI)	Age 5 Adjusted OR (95%CI)
Strabismus alone	1.00	1.00
Refractive amblyopia	0.07 (0.04-0.12)	0.21 (0.12-0.38)
Strabismic/mixed amblyopia	0.54 (0.29-0.99)	2.16 (0.71-6.57)

Adjusted for sex, ethnicity, birth order, gestational age, maternal education, household language, and household income

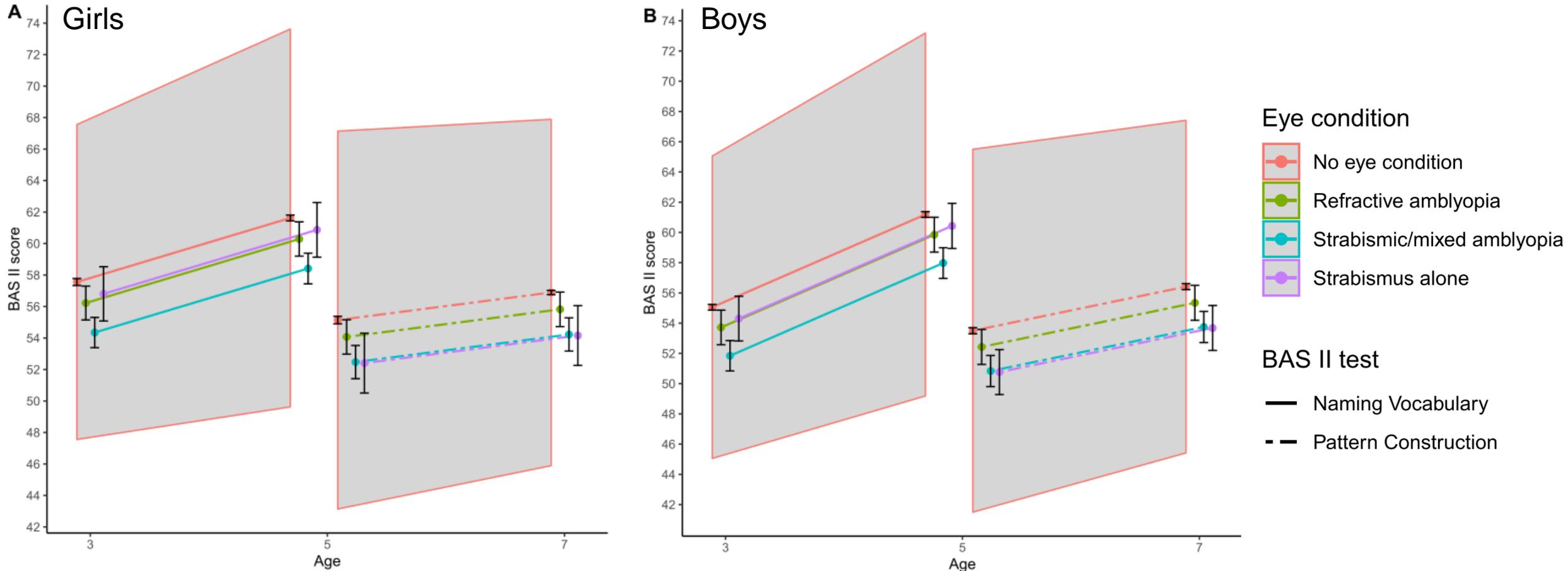
Note that child vision screening in the UK is undertaken at ages 4 to 5 years. All participants had started treatment by age 7 years

Odds of poor school readiness at age 3 years

Eye condition	Adjusted OR (95%CI)
No eye condition	1.00
Strabismus alone	1.02 (0.69-1.51)
Refractive amblyopia	1.04 (0.68-1.60)
Strabismic/mixed amblyopia	2.04 (1.09-3.82)

Adjusted for treatment, sex, ethnicity, birth order, gestational age, maternal education, household language, and household income

Age-related cognitive trajectories



- Adjusted for sex, ethnicity, birth order, gestational age, maternal education, household language, and household income
- Shaded area is the age-related non-significant clinical difference from the reference group of no eye condition
- Age at starting treatment was not associated with Naming Vocabulary ($p=0.43$) and Pattern Construction ($p=0.14$)

Discussion

- Amblyopia is not significantly associated with adverse cognitive performance and trajectories in early schooling and there is no evidence that this is due to a mediating effect of treatment
- Although amblyopia combined with strabismus is associated with poor school readiness, this is not translated into poor cognitive performance
- Taken together with the existing evidence of no associations between amblyopia and educational outcomes in adult life, our findings suggest that the impact of amblyopia on education is not of itself a reasonable justification for screening
- Reference:

Gitseis LA, Cortina-Borja M, Rahi JS (2020) Is amblyopia associated with school readiness and cognitive performance during early schooling? Findings from the Millennium Cohort Study. *PLoS ONE* 15(6): e0234414. <https://doi.org/10.1371/journal.pone.0234414>