Screening and treating amblyopia - are we making a difference?

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The basics

- Amblyopia is a significant public health problem that affects between 1% and 5% of adults.
- In developed countries it is the leading cause of monocular vision loss in among people younger than 40 years
- Treating amblyopia is usually an easy task

- Screening for amblyopia is therefore important

But how can we quantify the effect of screening?

- Conducting control trials is not ethical
- Comparing the prevalence of amblyopia between countries with different screening methods can be puzzling…
- Amblyopia rate in developed countries: United Kingdom, Sweden, and Australia: 0.5% and 3%.
- And in less developed areas such as southern Jordan, rural Indonesia and northern Mexico….

  0.3%-2.5%

We have a great database

- At 16 year age, all Israelis (without any preliminary selection criteria) are obligated by law to appear before the IDF Recruiting Office
- They undergo comprehensive medical examination and history
- That includes visual acuity and refraction

And we have some unusual circumstances

Jewish immigration to Israel was refused during the times of the Soviet Union

During the nineties gates were open and 1.2 million Jews immigrated to Israel

Study population

- All nominees for military service who were 16 years of age and appeared before the recruitment office between 1998 and 2003
- Two subgroups
  - born in Israel
  - born in the former Soviet Union and immigrated to Israel after they were 10 years of age

Exclusion criteria

Any ocular disease except for strabismus, ptosis, cataract, or corneal opacity

We looked for

- The prevalence of VA less than 6/12 in at least one eye
- The prevalence of amblyogenic factors
  - Anisometropia ≥ 1.0D
  - Ansometropia and strabismus
  - Strabismus
  - Bilateral heprmetropia ≥ 5.0D
  - Bilateral myopia ≥ 7.0D
  - Bilateral astigmatism ≥ 2.0D
  - Ptosis
  - Cataract

Results

- A total of 305,712 were examined in the IDF Recruiting Center between 1998 and 2003
- 292,255 subjects were enrolled in the study
- 260,186 (89%) were born in Israel
- 32,069 (11%) were born in the former Soviet Union and immigrated to Israel after the age of 10 years

Results

Amblyogenic Factor	Native Israelis (*n* = 260,186)	Immigrants from U.S.S.R. (*n* = 32,069)	*P*
Anisometropia ≥ 1 D sphere and/or cylinder	(6.3%) 17,226	(2.9%) 1780	0.00001>
Strabismus *	(0.89%) 2,321	(0.81%) 259	0.12
Strabismus and anisometropia	(0.16%) 442	(0.15%) 50	0.5
Bilateral myopia ≥7 D	(0.65%) 1,706	(0.28%) 90	0.00001>
Bilateral hyperopia ≥4 D' †	(0.17%) 440	(0.29%) 93	0.00001>
Bilateral astigmatism ≥2 D' †	(0.83%) 2,156	(1.2%) 392	0.00001>
Cataract	(0.09%) 233	(0.09%) 30	0.8
Ptosis	(0.05%) 125	(0.04%) 13	0.56

VA ≤ 6/12 in at least one eye

	Subjects Enrolled	Subjects with Amblyopia	Prevalence of Amblyopia	*P*
Native Israelis	260,186	2565	0.98%	0.00001>
Former USSR immigrants	32,069	483	1.5%	

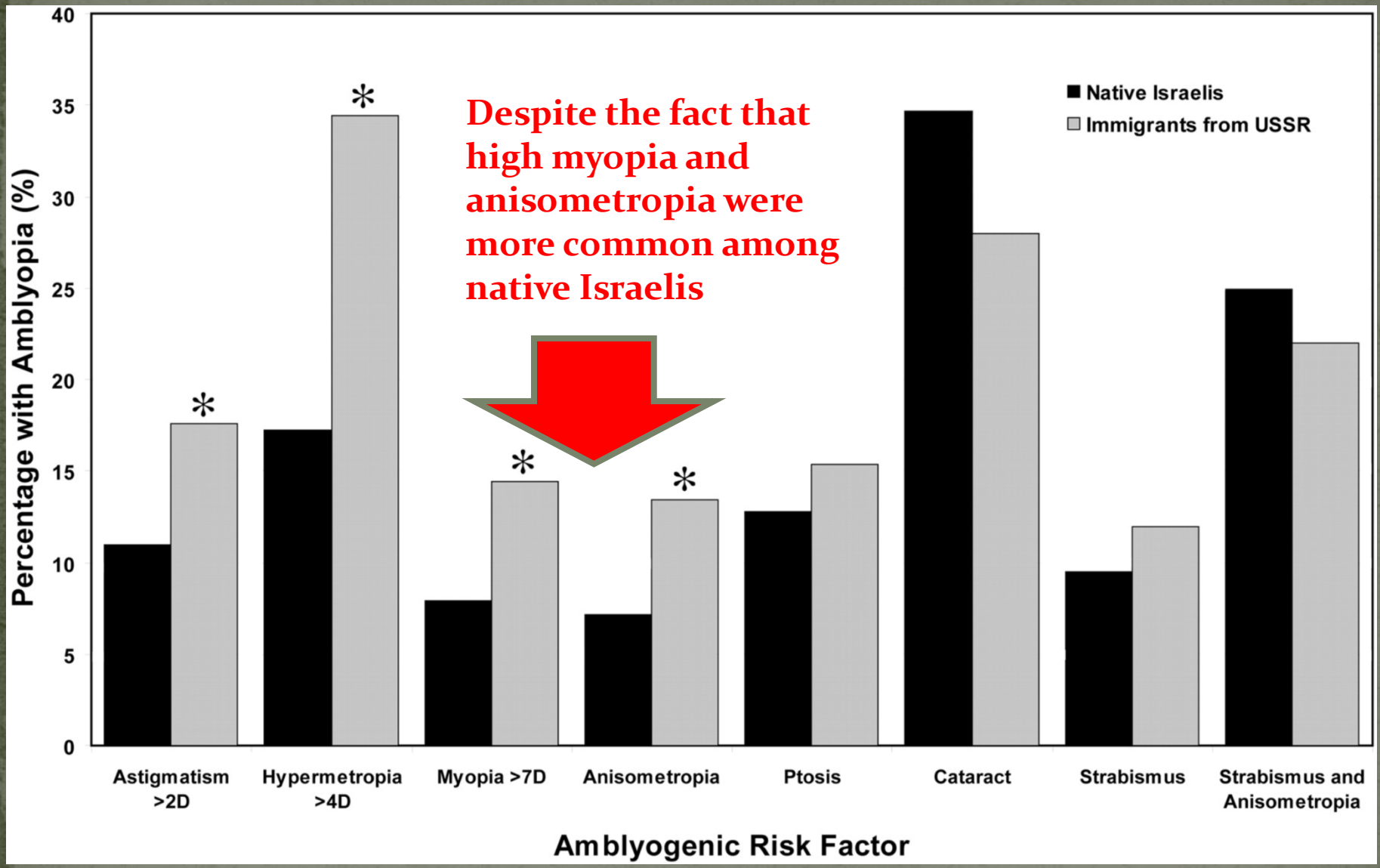
Causes for amblyopia

Cause of Amblyopia	Native Israelis (*n* = 2565)	Immigrants from USSR (*n* = 483)	*P*
Strabismus	(7.8%) 221	(6.4%) 31	0.28
Cataract	(2.1%) 60	(1.4%) 7	0.33
Ptosis	(0.56%) 16	(0.4%) 2	0.67
Undetermined	(24.5%) 692	(14.3%) 69	

No difference

Refractive amblyopia is causing the difference

Cause of Amblyopia	Native Israelis (*n* = 2565)	Immigrants from USSR (*n* = 483)	*P*
Anisometropia, total	(49.1%) 1,389	(53.8%) 260	0.05
Bilateral myopia ≥7 D	(4.7%) 135	(2.7%) 13	0.04
Bilateral hyperopia ≥4 D	(2.7%) 76	(6.6%) 32	0.00001>
Bilateral astigmatism ≥2 D	(8.4%) 237	(14.3%) 69	0.00003



Immigrants had double the rate of amblyopia caused by refractive errors, but similar rates of

Vision screening in Israel

- Red reflex before discharge from nurseries
- Fixation and following by pediatrician before the age of 6 months
- At the age of 3 years, a verbal examination of visual acuity is performed by a nurse
- Visual acuity and alignment at the beginning of the first year of elementary school by an optometrist
- All examinations with no charge
- Every child who fails these examinations is referred to an ophthalmologist for further treatment.

Vision screening in the former USSR

- attempts were also made to screen and treat children for amblyopia
- no uniform system of screening
- availability and quality of medical services varied among the different states of the Soviet Union
- Sometimes, even when amblyopia was diagnosed, glasses, especially with high cylinder, were hard to find.

Possible explanation

- Apparent causes for amblyopia such as Strabismus, ptosis and media opacity were diagnosed and treated in both countries – hence the similar rates of amblyopia
- Refractive errors which needs screening to be diagnosed – were less likely to be treated in the former USSR

Other studies

Amblyopia treatment outcomes after preschool screening *v* school entry screening: observational data from a prospective cohort study

C Williams, K Northstone, RA Harrad, JM Sparrow, I Harvey, and the ALSPAC Study Team*

Br J Ophthalmol 2003;**87**:988–993

- screening at the ages of 8, 12, 18, 25, 31, and 37 months ("deluxe screening") reduced the prevalence of amblyopia to 0.6% as opposed to 1.8% in a group that was screened only once at the age of 37 months

Acta Ophthalmol (Copenh). 1991 Dec;69(6):796-8.

Prevalence of amblyopia in old people without previous screening and treatment. An evaluation of the present prophylactic procedures among children in Denmark.

Vinding T[1], Gregersen E, Jensen A, Rindziunski E.

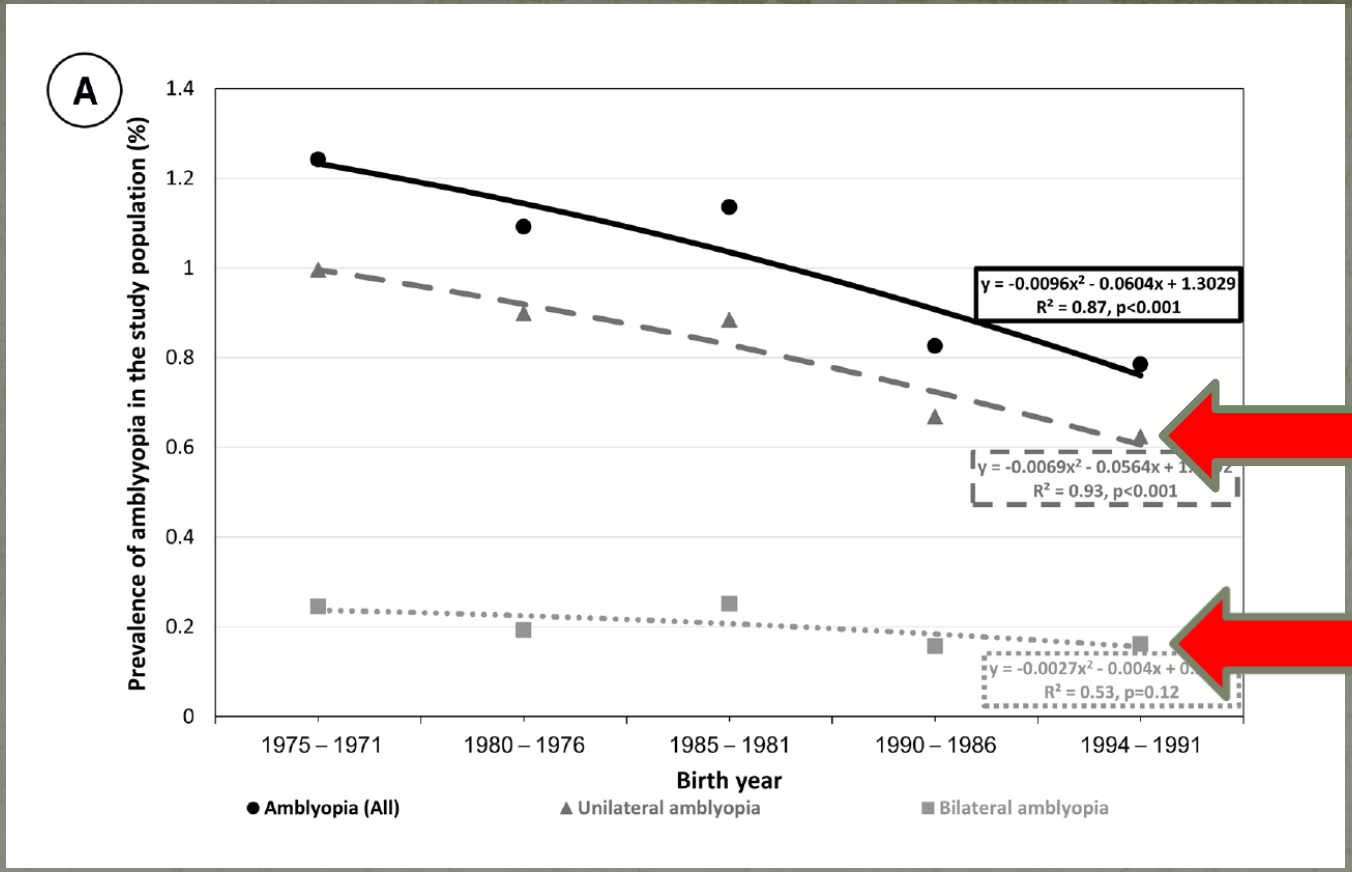
Author information

The rate of amblyopia before and after screening was implemented in Denmark (*n*= 1000)
before was 2.9%
After 1%

Amblyopia and strabismus: trends in prevalence and risk factors among young adults in Israel

Yinon Shapira,[1] Yossy Machluf,[2] Michael Mimouni,[1] Yoram Chaiter,[2] Eedy Mezer[1,3]

Compared prevalence of amblyopia and strabismus between 1971 through 1994 among conscripts



- Unilateral amblyopia declined by 33% (1.2% to 0.8)
- Bilateral amblyopia remained stable (0.2%)
- Probably due to better screening

In conclusion