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A Lifetime of Vision
July 17, 2019 | National Press Club | Washington D.C.

What is Low Vision?

- Vision that is not adequate for a person's needs
- Term implies some reduction in visual acuity and/or visual field
- Legal Blindness is a subset of Low Vision



- 1 sees nothing
- 1 sees light
- 5 are legally blind
- 1 has vision impairment
- 4 have normal sight
- 2 are deaf-blind



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<http://www.who.int/blindness/GLOBALDATAFINALforweb.pdf?ua=1>

Public Health Significance of Pediatric VI

Global estimate of the number of people with VI, by age, 2010

- Estimated 1 to 3 per 10,000 children
- Significant PH problem due to number of life-years affected
- Global financial burden of childhood blindness (20/400 or worse by WHO definition) exceeds that of adult blindness
- Only cataract ranks higher on the global burden of eye disease when measured in DALY's

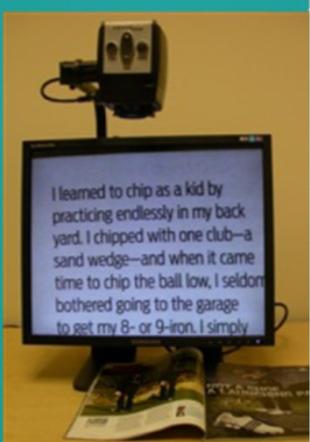
Ages (in years)	Population (millions)	Blind (millions)	Low Vision (millions)	Visually Impaired (millions)
0-14	1,848.50	1.421	17.518	18.939
15-49	3548.2	5.784	74.463	80.248
50 and older	1,340.80	32.16	154.043	186.203
all ages	6,737.50	39.365 (0.58)	246.024 (3.65)	285.389 (4.24)



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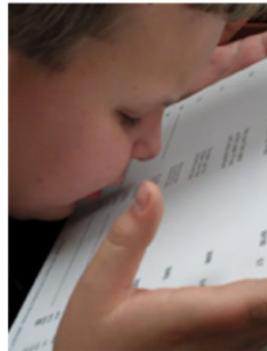
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Rehabilitation for Children with Low Vision



- **GOAL:** to level the playing field – provide the tools and techniques to minimize the effects of vision impairment on daily activities, including school.
- **FOUNDATION:** a comprehensive eye health examination. Followed by low vision evaluation including prescription of devices and recommendations that are individualized for each child.
- **BEST PRACTICE:** team approach including optometrists, ophthalmologists, therapists, orientation & mobility specialists, parents and educators.
- **CHALLENGES:** shortages of teachers with certification in vision impairment, low reimbursement for vision rehabilitation, lack of funding for devices and equipment.



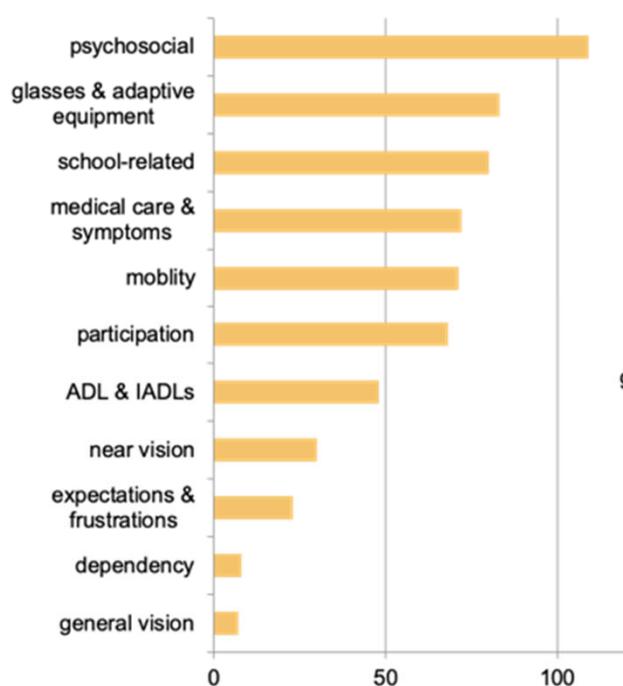
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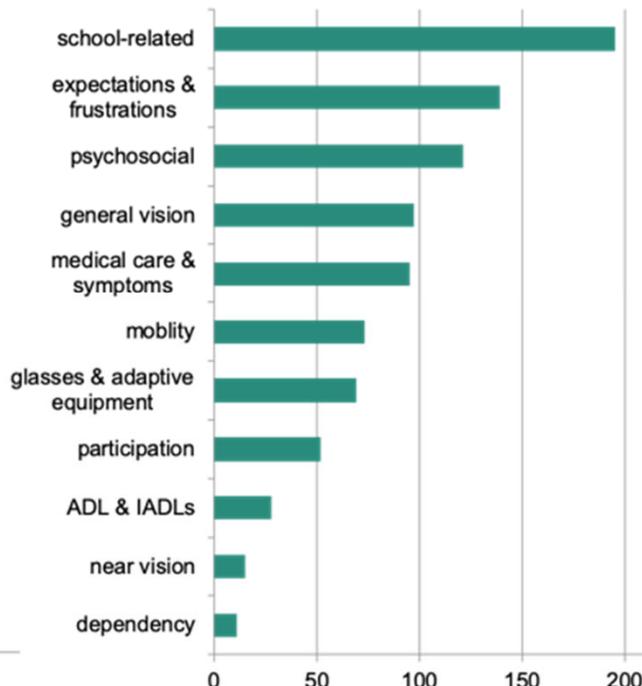
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Quality of Life

Child Focus Groups

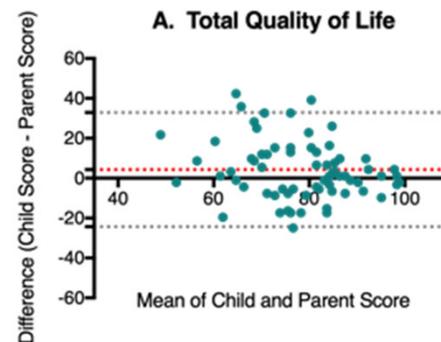


Parent Focus Groups



Comparing Children with and without vision impairment using the PedsQL 4.0

Total PedsQL 4.0 Score	Visual Imp Mean (SD)	Control Mean (SD)	p-value
Children (8-12)	n=32	n=19	
Child Report	77.0 (11.7)	85.1 (11.6)	0.02*
Parent Report	77.4 (12.2)	88.8 (12.2)	0.002*
Teens (13-18)	n=38	n=25	
Child Report	83.2 (11.2)	90.9 (8.4)	0.005*
Parent Report	75.0 (16.5)	92.1 (6.5)	<0.001*



Submitted to JAAPOS, June 2019





Vision and Attention

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FEATURE ARTICLE-PUBLIC ACCESS

ADHD and Vision Problems in the National Survey of Children's Health

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Unadjusted associations between ADHD and vision problem severity

	Mild VP OR (95% CI)	Moderate VP OR (95% CI)	Severe VP OR (95% CI)
Any level ADHD	1.8 (1.1–2.9)	2.6 (1.6–4.1)	1.6 (0.8–3.1)
Severity ADHD*	1.9 (1.2–3.0)	2.8 (1.7–4.4)	1.6 (0.8–3.3)
Medicated ADHD	1.4 (0.6–3.0)	0.5 (0.2–1.2)	1.3 (0.4–3.4)

Reference group: no vision problems.

*Ordinal regression, odds of being in higher ADHD severity category.
VP, vision problems not correctable with glasses or contact lenses.

Prevalence of attention-deficit/hyperactivity disorder among children with vision impairment

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Table 1. Demographic and ocular characteristics for the entire sample and for the subgroups of those who have ever had an ADHD diagnosis as well as those who have never had an ADHD diagnosis

	Overall (n = 245)	Ever ADHD (n = 56)	Never ADHD (n = 189)	P value ^a
Better eye VA logMAR, mean ± SD	0.73 ± 0.38	0.65 ± 0.33	0.76 ± 0.39	0.02
Worse Eye VA ^b logMAR, mean ± SD	0.93 ± 0.38	0.81 ± 0.32	0.97 ± 0.40	0.001
Age, mean ± SD	10.7 ± 3.8	11.2 ± 3.2	10.5 ± 4.0	0.9
Nystagmus ^c				
Present, n (%)	165 (69.6)	30 (18.2)	135 (81.8)	0.03
Absent, n (%)	72 (30.4)	23 (31.9)	49 (68.1)	
Sex				
Male, n (%)	141 (57.8)	34 (24.1)	107 (75.9)	0.5
Female, n (%)	103 (42.2)	21 (20.4)	82 (79.6)	
Race				
White, n (%)	169 (69)	44 (26)	125 (74)	0.1
Nonwhite, ^d n (%)	76 (31)	12 (15.8)	64 (84.2)	

JAAPOS, 2014

Reading by Children with Low Vision

Grade	MNREAD Maximum Reading Rate (wpm)			Basic Reading Inventory Word Passages Reading Rate (wpm)		
	VI	Control	p-value	VI	Control	p-value
1-3	122 ± 49	168 ± 63	0.2	98 ± 35	116 ± 20	0.4
4-6	144 ± 52	392 ± 180	<0.01*	129 ± 46	136 ± 27	0.6
7-9	201 ± 41	387 ± 224	<0.01*	163 ± 49	175 ± 45	0.5
10-12	174 ± 45	472 ± 243	<0.01*	157 ± 47	187 ± 28	0.2
All	163 ± 54	376 ± 209	<0.01*	140 ± 51	156 ± 42	0.1

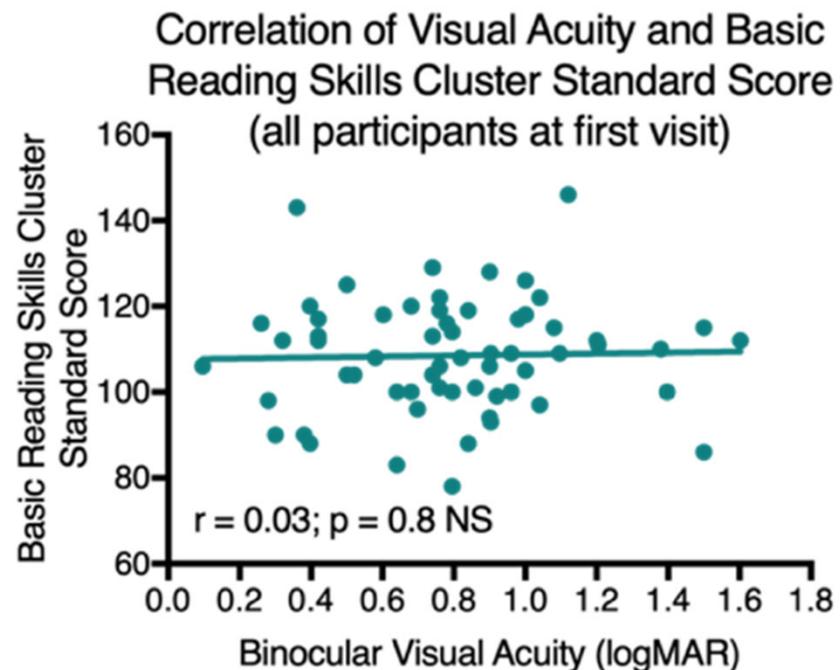


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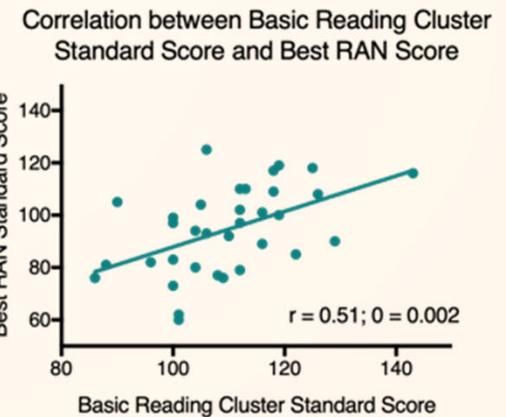
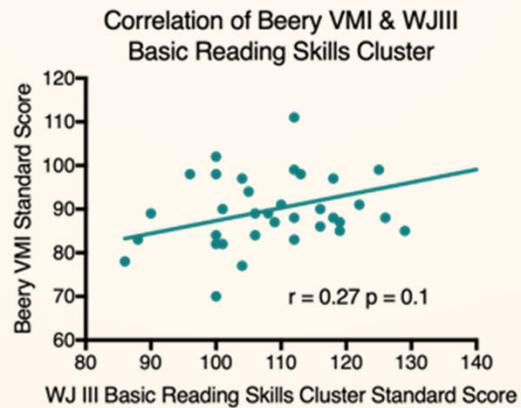
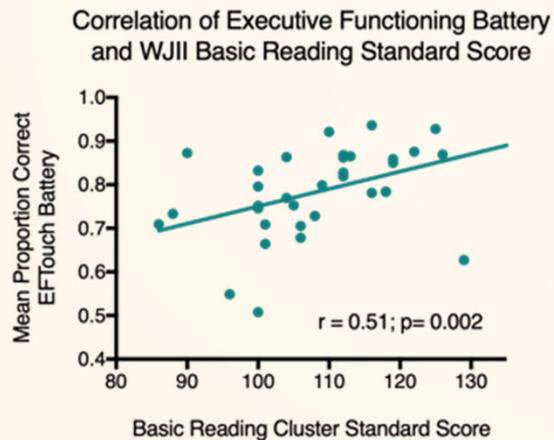
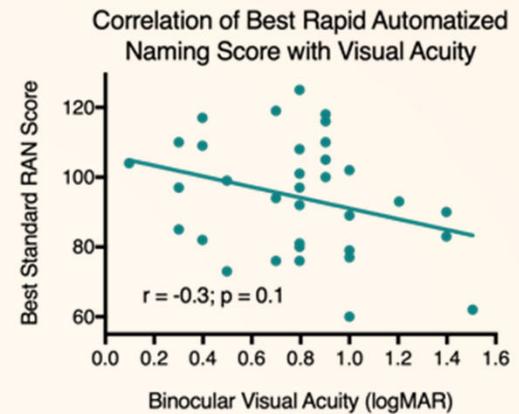
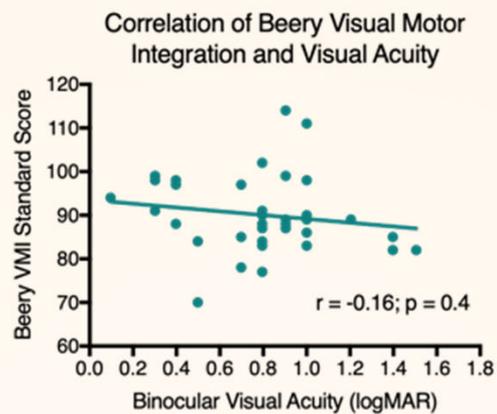
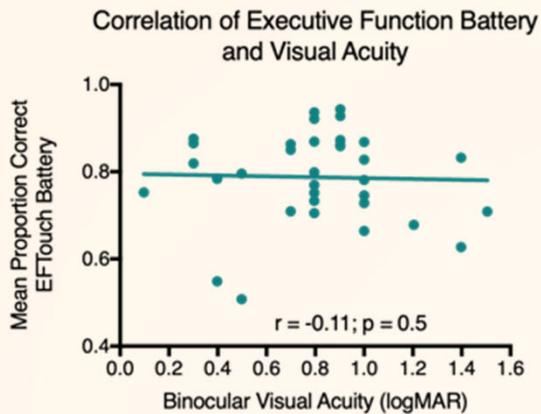
Reading in Emerging Readers with Low Vision



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Treatment for Hereditary Retinal Degeneration



- Treating hereditary retinal degenerations is not science fiction
 - Gene replacement
 - Gene editing,
 - Trophic factors
 - Optogenetics
 - Cell therapy
 - Prosthetics
- We now have an FDA approved gene therapy for Leber Congenital Amaurosis (a severe early onset cause of blindness)
 - 3 patients seen in the UAB Center for Low Vision Rehabilitation have been treated with remarkable results
- Treatments for many other genetic eye diseases are under investigation



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Summary and Future Work

- Children with vision impairment are a small proportion of the children in the US, however VI has lifelong impact.
- There are resources and equipment to help ameliorate the disability caused by vision impairment, however they are not universally available and children in rural areas are typically more affected by these shortages.
- Research on the impact of vision impairment in children is scarce, but our work shows that many of these children CAN and DO keep up with their normally sighted peers.
- Work is underway to better understand the relationship between impaired vision and learning so that we can maximize the success of children with low vision.
- Medical treatments for many genetic eye disorders are on the horizon.



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