



# Vision Screening: Evidence-Based Options for Early Head Start and Head Start . . . AND . . . Relationship Between Vision and Learning

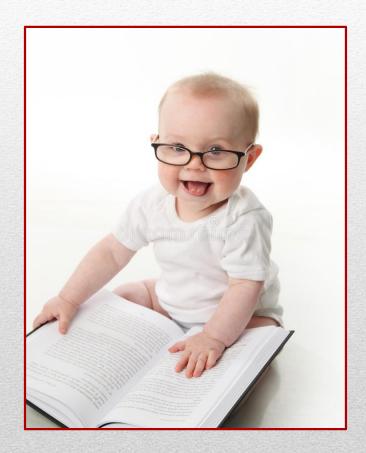
Elyse Fineman, MPH, MHA, and
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Created by
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# Information You Will Take Home ... 3 Learning Objectives

Describe the month infants should be referred for a pediatric eye exam if a baby's eyes continue to cross or wander.

Describe 3 evidence-based vision screening tool for ages 1, 2, 3, 4, and 5 years.

Describe 3 positive outcomes in learning and behaviors after vision screening, an eye examination, and treatment.



## Current State of Children's Vision in the U.S.

Up to 1 in 17 preschool-aged children in the USA has a vision problem that requires treatment.<sup>1</sup>

- Children's vision problems may lead to <u>permanent</u> vision loss if not treated, and
- Cause problems socially, academically, and developmentally.
- Nearly all (94%) of these vision problems can be found early with a vision screening . . . if children who do not pass vision screening:
  - See an eye doctor;
  - Receive treatment, if necessary; and
  - Follow the eye doctor's suggestions to improve vision.





<sup>1</sup>U.S. Preventive Services Task Force. (2017). *Vision screening in children ages 6 months to 5 years* (Evidence Synthesis No. 153). Rockville, MD: Agency for Healthcare Research and Quality, U.S. Department of Health and Human Services. Retrieved from

https://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0098873/

<sup>2</sup>Varma, R., Tarczy-Hornoch, K., & Jiang, X. (2017). Visual impairment in preschool children in the United States: Demographic and geographic variations from 2015 to 2060. *JAMA Ophthalmology, 135*(6), 610-616.

# Impact of Vision Health on Development, Behavior, and Learning Readiness

- Research shows a link between health and a child's ability to perform optimally in school.
- "Health Barriers to Learning" include vision deficits.
- Left undetected and untreated, "Health Barriers to Learning" can affect a child's ability to:
  - Pay attention in class
  - Be motivated to learn
  - Maintain consistent attendance
  - Perform well academically
  - Graduate high school



Gracy, D., Fabian, A., Basch, C. H., Scigliano, M., MacLean, S. A., MacKenzie, R. K., & Redlener, I. E. (2018). Missed opportunities: Do states require screening of children for health conditions that interfere with learning? *PLoS ONE 13*(1): Retrieved from <a href="http://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0190254&type=printable">http://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0190254&type=printable</a>

Ruderman, Marjory. 2016. Children's Vision and Eye Health: A Snapshot of Current National Issues (1st ed.). Chicago, IL: National Center for Children's Vision and Eye Health at Prevent Blindness. Retrieved from <a href="https://nationalcenter.preventblindness.org/sites/default/files/national/documents/Childrens Vision Chartbook F.pdf">https://nationalcenter.preventblindness.org/sites/default/files/national/documents/Childrens Vision Chartbook F.pdf</a>

# 7 Behaviors that <u>May</u> be Related to Vision Disorders

Behaviors are not always related to vision.

A vision disorder is something to consider when the behaviors occur.

Conduct vision screening to rule out vision as a causal factor.





1. Talking in class — Child said he talked because he was asking other students to help him read material on board.



**2. Notably quiet in class** – Child said she stopped looking at board . . . She couldn't see material on board.



3. "Spacey" and in own world — Interrupt story time to come forward to see book pictures. "I can see that now!"



**4. Difficulty sitting still** – Up and moving in circle time or watching TV with brother. Loner and bored. Now sits and participates in group activities.



5. Frustrated with "academic work" – Before glasses, "things looked dusty". Different child, happier, less frustrated.



6. Squinting during class activities — "Mommy! There are numbers on that circle on the wall!"



7. Clumsiness until receiving glasses – "I have realized through these screenings that vision can affect a child's behavior, balance, and academic performance."

# Relationship Between Vision and Learning

Henry looked to the right. He looked to the left. He looked up and he looked down. Where had Frog gone? Henry did not like being alone in the forest. "Frog, where are you?" Henry called. "Please come back!"

## **Multistate Level**

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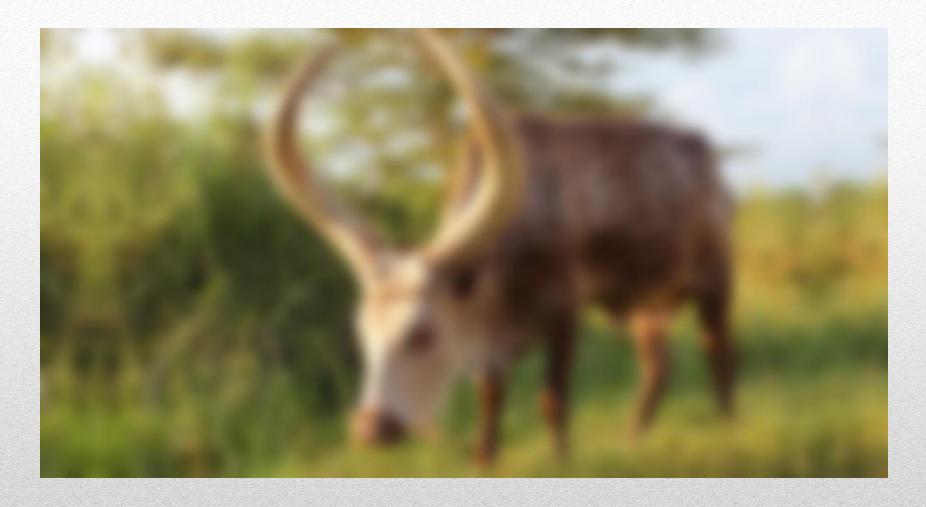
- 2015 Vision in Preschoolers
   Hyperopia in Preschoolers
   Study (VIP-HIP) found:
  - Children ages 4 and 5 years with uncorrected hyperopia (farsightedness ≥4.0 D) scored significantly worse on a test of early literacy than children with normal vision.
  - ≤ 4.0 D also had lower scores, but difference not statistically significant

- Performance most affected:
  - Print knowledge subtest,
  - Measuring ability to identify letters and written words

VIP-HIP Study Group, Kulp, M. T., Ciner, E., Maguire, M., Moore, B., Pentimonti, J., Pistilli, M., Cyert, L., Candy, R., Quinn, G., & Ying, G. (2016). Uncorrected hyperopia and preschool early literacy: Results of the Vision In Preschoolers – Hyperopia In Preschoolers (VIP-HIP) Study. *Ophthalmology, 123*(4), 681-689.



Full vision - <a href="http://www.onedollarglasses.org/eye-test/full-vision.html">http://www.onedollarglasses.org/eye-test/full-vision.html</a>



Vision defect of 4.0 D - <a href="http://www.onedollarglasses.org/eye-test/4-diopters.html">http://www.onedollarglasses.org/eye-test/4-diopters.html</a>

# Diopter defined

- "Diopter" refers to the strength of a prescription lens required to give a child the clearest vision possible. The higher the number, the stronger the prescription lens.
- A child requiring 4 diopters of correction in prescription glasses, or contact lenses, would likely struggle with blurred vision, crossed eyes, or both, and would see much better with prescription glasses.



# **Multiple Inner City Schools Level**

- 317 2<sup>nd</sup> and 3<sup>rd</sup> grade students in 12 high-poverty schools in Baltimore City School District in phase 1
- Poor baseline visual acuity and hyperopia associated with reduced reading achievement and worse baseline reading scores





Collins, M. E., Mudie, L., Slavin, R. E., Corcoran, R. P., Owoeye, J., Chang, D., Friedman, D. S., & Repka. M. X. (2016). Prevalence of eye disease and reading difficulty in an inner city elementary school population—preliminary results of the Baltimore Reading and Eye Disease Study (BREDS) [Abstract]. Journal of AAPOS, 20(4), e29-e30. Retrieved from <a href="http://www.jaapos.org/article/S1091-8531(16)30239-7/abstract">http://www.jaapos.org/article/S1091-8531(16)30239-7/abstract</a>

# Single School District Level

2015 study of low-income children ages 3 through 5 years screened in South Carolina's Charleston County School District – after diagnosis and treatment with prescription glasses – found:

- Improvement in academic progress.
- Increase in focus during lessons.
- Increase in participation and classroom interaction.
- Improvement in confidence and behavior.



Peterseim, M. M., Papa, C. E., Parades, C., Davidson, J., Sturges, A., Oslin, C., Merritt, I., & Morrison, M. (2015). Combining automated vision screening with on-site examinations in 23 schools: ReFocus on Children Program 2012 to 2013. *Journal of Pediatric Ophthalmology & Strabismus, 52*(1), 20-24.

## Early Identification & Treatment Make a Difference

- First grade reading ability found to be predictive of 11<sup>th</sup> grade reading outcomes, including:
  - Reading comprehension,
  - Vocabulary, and
  - General knowledge.

Children who lag in 1<sup>st</sup> grade but catch up by 3<sup>rd</sup> or 5<sup>th</sup> grade have good prognosis for future reading level.



Cunningham, A. E., & Stanovich, K. E. (1997). Early reading acquisition and its relation to reading experience and ability 10 years later. *Developmental Psychology*, 33(6), 934-945.



# Steps to Simple Solution









## What Does an "evidence-based Approach" Mean?

The National Center on Early Childhood Health and Wellness defines evidence-based as: "an umbrella term that refers to the use of the **best research evidence** (found in health sciences literature) and **clinical expertise** (what health care providers know).

[Adapted from the National Institutes of Health <a href="https://prevention.nih.gov/resources-for-researchers/dissemination-and-implementation-resources/evidence-based-programs-practices">https://prevention.nih.gov/resources-for-researchers/dissemination-and-implementation-resources/evidence-based-programs-practices</a>.]

## For example:

- Simply stating a tool was used to screen 10,000 children does not make the tool evidence-based.
- A peer-reviewed publication stating the tool was used to screen 10,000 children, screening results were compared with eye examination results, and the tool found 90% of children with vision disorders is an example of an evidence-based tool.

# Key Year 1 Vision Development Milestones













#### 18 Vision Development Milestones From Birth to Baby's First Birthday

P. Kay Nottingham Chaplin, EdD - Kira Baldonado, BA

\*To calculate "corrected age", subtract the number of weeks born before 40 weeks of gestation

from the chronological age. For example, chronological age = 6 months (24 weeks). Child born

at 28 weeks gestation. 40 weeks minus 28 weeks = 12 weeks. Chronological age of 24 weeks minus 12 weeks equal 12 weeks (3 months). Corrected age is 3 months. You may find this age

calculator helpful: https://mymonthlycycles.com/premature\_baby\_age\_calculator.jsp

#### About this Tool:

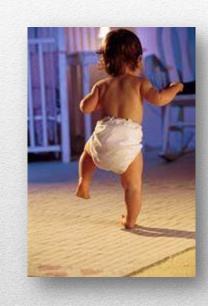
- This document is a vision screening tool for Early Head Start, Parents as Teachers, and other early care and education programs
- This tool is a table containing vision milestones in order of typical development.
- The 1<sup>st</sup> column lists the age.
- The 2<sup>nd</sup> column lists the milestones typically expected to occur for the age.
- The 3<sup>rd</sup> column lists the questions to ask.
- The 4<sup>th</sup> column lists Next Steps when a referral is required. It also provides activities that parents and caregivers can do to help with the milestones.
- Because each child develops differently and may meet the vision milestones at different ages, vision milestones may vary up to 6 weeks; some questions provide ages for rescreening before referring.
  - Although milestones may vary up to 6 weeks, if baby's eyes appear to be constantly misaligned (possible strabismus) at age 2 months or older, refer immediately for an eye examination.
- When using this tool with children who were born prematurely and have no health challenges, adjust chronological age to the
  corrected age\* and use this tool based on corrected age (see above box). Visual development milestones may be delayed if
  babies have health challenges (i.e., genetic syndromes, neurologic and metabolic conditions, etc.). For these children, use
  vision screening results from the baby's primary care provider or eye examination results from the baby's eye care professionals
  to meet your vision screening mandate.

#### Instructions:

- 1. Visual skills typically develop in a particular order. To determine if the baby has met all vision milestones, begin with Page 2 regardless of baby's age. Do not skip to the chronological or corrected age of the baby you are screening.
- 2. Check the appropriate boxes in the "Questions" column. Some will require rescreening if the vision milestone has not been met.
- 3. Complete the "Questions" column of the table before completing the Pass/Rescreen/Refer Documentation pages beginning on page 10. This tool and/or the Pass/Rescreen/Refer Documentation can be placed the baby's file for record-keeping purposes.
- 4. Use this tool throughout baby's first year to review vision development milestones.

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- Time for reaching milestones can vary up to 6 weeks . . . except milestone related to straight eyes.
- Slides show when baby should reach milestones.
- Process:
  - Milestone(s) and age or age range when milestone(s) should occur
  - Questions to ask or behaviors to monitor about the milestones
  - What to do if milestones are not met . . .
     or next steps



 Many vision milestones are related to overall developmental milestones . . . want you to think about those milestones from a perspective of vision . . . or how baby's vision could impact reaching a milestone.



Child's Name:	DOB:	Age:

1. Baby begins to focus on lights, faces, and objects 8 to 15 inches (20.32 – 38.1 cm) in front of his/her face?   38.1 cm) inches away from his/her face.   2. Baby begins to follow slowly moving lights, faces, and objects at near.   3. It make from BabyCentre: out/11 objects 8 to 15 inches away from face.   3. It make from BabyCentre: out/11 objects 8 to 15 inches away from face.   4. It make from BabyCentre: out/11 objects 8 to 15 inches away from face.   5. It make from BabyCentre: out/11 objects 8 to 15 inches away from face.   6. It make from Zero to Three: out/11 objects 8 to 15 inches away from face.   7. It make from BabyCentre: out/11 objects 8 to 15 inches (20.32 – 38.1 cm) objects 8 to 15 inches (20.32 – 38.1 cm) objects 8 to 15 inches (20.32 – 38.1 cm) objects 8 to 15 inches (20.32 – 38.1 cm) objects 9 cm face.   8. It make from BabyCentre: out/11 objects 9 cm face.   9. It make from BabyCentre: out/11 objects 9 cm face.   1. Does baby focus on lights, faces, and objects 9 cm) in front of his/her face?   1. Does baby focus on lights, faces, and objects 9 cm) in front of his/her face?   1. Does baby focus on lights, faces, and objects 9 cm) in front of his/her face?   1. Does baby focus on lights, faces, and objects 9 cm) in front of his/her face?   1. Does baby focus on lights, faces, and objects 9 cm) in front of his/her face?   1. Does baby focus on lights, faces, and objects 9 cm) in front of his/her face?   1. Does baby focus on lights, faces, and objects 9 cm) in front of his/her face?   1. Does baby focus on lights, faces, and objects 9 cm) in front of pour baby's primary health care provider for further evaluation and to coordinate a referral for an eye examination.   Refer to baby's primary health care provider for further evaluation and to coordinate a referral for an eye examination.   Refer to baby's primary health care providers on the to coordinate a referral for an eye examination.   Refer to baby's primary health care providers on the coordinate areferral for an eye examination.   1	AGE (Milestones may vary up to 6 weeks.)	MILESTONE	QUESTIONS	NEXT STEPS
ources/164-play-activities-for-birth-to-12-months  baby's face. Play together and have fun!  Picture 2 – Passing a patterned object within 8 to 15 inches of baby's face.	Image from BabyCentre: https://www.babycentre.co.uk/l1 048954/how-your-baby-learns- to-explore-photos  Picture 1 – Baby looks at object 8 to 15 inches away from face.  Image from Zero to Three: https://www.zerotothree.org/res ources/164-play-activities-for- birth-to-12-months  Picture 2 – Passing a patterned object within 8 to 15 inches of	focus on lights, faces, and objects 8 to 15 (20.32 – 38.1 cm) inches away from his/her face.  2. Baby begins to follow slowly moving lights, faces, and objects at near.  NEXT MILESTONE DURING AGE 2 <sup>ND</sup>	objects 8 to 15 inches (20.32 – 38.1 cm) in front of his/her face?  ☐ Yes (pass). ☐ Not Yet (rescreen within 6 weeks). ☐ Date for rescreen: ☐ If "No" after rescreening, move to Next Steps.  2. Is baby beginning to follow slowly moving lights, faces, and objects with his/her head and eyes? ☐ Yes (pass). ☐ Not Yet (rescreen within 6 weeks). ☐ Date for rescreen: ☐ If "No" after rescreening, move to	provider for further evaluation and to coordinate a referral for an eye examination.  Refer to Birth to 3 Early Intervention program.  Activities parents and caregivers can do: Hold your baby in front of you, look at your baby, and slowly move your head from side to side. Play together and have fun! Hold a patterned, high-contrast toy within 8 to 15 inches (20.32 – 38.1 cm) of your baby's face. Slowly move the object up and down or side to side. Play together and have fun! Place a small rattle or colorful, plastic right in your baby's hands and gently shake your baby's face. Play together and

Child's Name: _	DOB:	Age:

AGE (Milestones may vary up to 6 weeks.)	MILESTONE	QUESTIONS	NEXT STEPS		
During 2 <sup>nd</sup> and 3 <sup>rd</sup> months	Baby begins to notice his/her hands.	<ul> <li>Is baby aware of his/her hands during the 2<sup>nd</sup> month?</li> <li>Yes (pass).</li> </ul>	Refer to baby's pediatric primary health care provider for further evaluation and to coordinate a		
Image from CDC: https://www.cdc.gov/ncbddd/act early/milestones/photolibrary/2 months.html  Picture 5 – Lively visual communication with social smile.	Baby makes eye contact with parent or caregiver.	<ul> <li>□ No (refer and move to Next Steps).</li> <li>4. Does baby look directly at parent's or caregiver's eyes?</li> <li>□ Yes (pass).</li> <li>□ Not Yet (rescreen within 6 weeks).</li> <li>□ Date for rescreen:</li> <li>□ If "No" after rescreening, move to Next Steps.</li> </ul>	referral for an eye examination.  Refer to Birth to 3 Early Intervention program.		
	5. Baby follows moving lights, faces, people, and objects with both eyes together.		<ul> <li>Activities parents and caregivers can do:</li> <li>Look at your baby with his/her face about 8 to 15 inches from your face, wait for your baby to</li> </ul>		
	6. Baby has a social smile.	5. Is baby following moving lights, faces, people, and objects with both eyes together?	look at your face; and smile, sing, or talk to your baby. Play together and have fun!		
Image from Lea Hyvärinen, MD, PhD http://www.lea-test.fi/index.html?start=en/asses sme/lowvisio/index.html	IF BABY IS AGE 3 TO 4 MONTHS, ALSO DO THE FOLLOWING MILESTONE	☐ Yes (pass). ☐ Not Yet (rescreen within 6 weeks). ☐ Date for rescreen: ☐ If "No" after rescreening, move to Next Steps. ☐ Is baby smiling at his/her parent or caregiver by age 3 months? ☐ Yes (pass). ☐ No (Refer and move to Next Steps.	Hold a favorite toy, bottle, or patterned and high-contrast object within 8 to 15 inches (20.32 – 38.1 cm) of your baby's face. Slowly move the object up and down or side to side. Play together and have fun!		
Picture 6 – Baby turns head away from the parent.					

# If Baby Does Not Maintain Stable Eye Contact or Avoids Looking at Parent or Caregiver . . .







Videos 2 and 3 from Lea Hyvärinen, MD, PhD

Refer for eye examination

Child's Name:		DOR:		Age:	
	_				
Pass/Rescreen/Refer	Documer	itation			
Birth through 1 <sup>st</sup> Month					
1. Does baby focus on lights, faces, and objects 8 to 15 inches (20.32	Screen Date		Rescreen Date:		
- 38.1 cm) in front of his/her face?					
	□ Pass	□ Rescreen	□ Pass	□ Refer health	
				care provider	
			_	□ Refer El	
Is baby beginning to follow slowly moving lights, faces, and objects	Screen Date:		Rescreen Date:		
with his/her head and eyes?		- D		- D (   W	
	□ Pass	□ Rescreen	□ Pass	□ Refer health	
				care provider	
				□ Refer EI	
During 2 <sup>nd</sup> and 3 <sup>rd</sup> Months					
Is baby aware of his/her hands during the 2 <sup>nd</sup> month?	Screen Dat	٥٠			
5. Is baby aware of his/her hands during the 2 - month?	□ Pass	e. □ Refer health	{		
	u Pass	care provider			
		□ Refer El			
Does baby look directly at parent's or caregiver's eyes?	Screen Dat		Rescreen	Date:	
4. Does baby look directly at parents of caregiver's eyes:	□ Pass	□ Rescreen	□ Pass		
	<b>-</b> 1 ass	- Nescreen	<b>-</b> 1 ass	care provider	
				□ Refer El	
5. Is baby following moving lights, faces, people, and objects with	Screen Date:		Rescreen Date:		
both eyes together?	Corcon Date.		reserven bate.		
Source to go the gold to the	□ Pass	□ Rescreen	□ Pass	□ Refer health	
				care provider	
				□ Refer El	
6. Is baby smiling at his/her parent or caregiver by age 3 months?	Screen Date:			•	
	□ Pass	Refer health	1		
		care provider			
		□ Refer EI			

Home-Based Visitor/Nurse Signature:

 $_{
m Page}10$ 

Date: \_\_\_\_\_

#### **Expert Contributors:**

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# Let's Try Using the Vision Development Milestones Tool

# Using the Milestones Tool – Case Profile #1

- Child's age: 5 months
  - Developmental skills exhibited:
    - Maintaining stable eye contact initiated by an adult
    - Social smile
    - Exploring hands and putting them in their mouth
    - Watching hand movements of others
    - Eyes drift and cross when tired

Pass or Refer?

Refer

# Using the Milestones Tool – Case Profile #2

- Child's age: 9 months
  - Developmental skills exhibited:
    - Maintains stable eye contact initiated by an adult
    - Social smile
    - Exploring hands and putting them in their mouth
    - Watching hand movements of others
    - One eye turns in
    - Goal-directed arm movements
    - Recognizes parents, caregivers, and Grandpa

Pass or Refer?

Refer

# Using the Milestones Tool – Case Profile #3

- Child's age: 9 months
  - Developmental skills exhibited:
    - Maintains stable eye contact initiated by an adult
    - Social smile
    - Exploring hands and putting them in their mouth
    - Watching hand movements of others
    - Eyes are straight
    - Goal-directed arm movements
    - Recognizes parents, caregivers, and Grandpa

Pass or Refer?

Pass

# Vision Screening Years 1 and 2



# **Cast of Characters**

#### NCCVEH:

- National Center for Children's Vision and Eye Health at Prevent Blindness
  - Optometry
  - Ophthalmology
  - Family Advocates
  - Nurses
  - Public Health Professionals
  - Educators

#### AAP:

- American Academy of Pediatrics
- American Association for Pediatric Ophthalmology and Strabismus
- American Academy of Ophthalmology
- American Association of Certified Orthoptists

# Years 1 and 2 - Vision Screening Tools

## Instrument-based screening

 Instruments assess the eye STRUCTURE, not how the brain interprets CLEARNESS of vision



- Instruments analyze digital images of the eyes to provide information about amblyopia risk factors:
  - Estimates of significant refractive error (hyperopia [farsightedness], myopia [nearsightedness], astigmatism [blurred vision at both near and far])
  - Estimates of anisometropia (significant difference of refractive error between the two eyes)
  - Estimates of eye misalignment

## **Instrument-Based Screening**

#### **AAP**

- Use beginning at age 12 months, not 6 months
- Ages 1 and 2 years

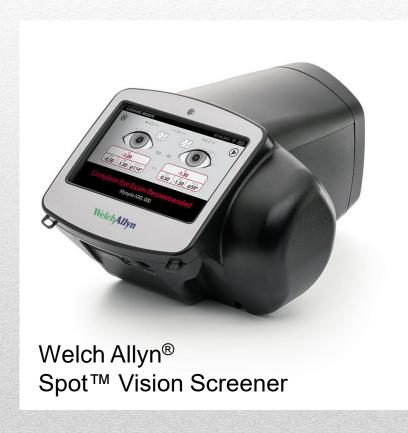




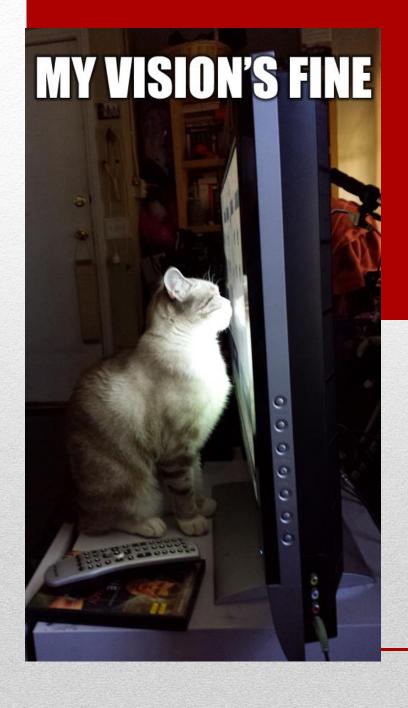


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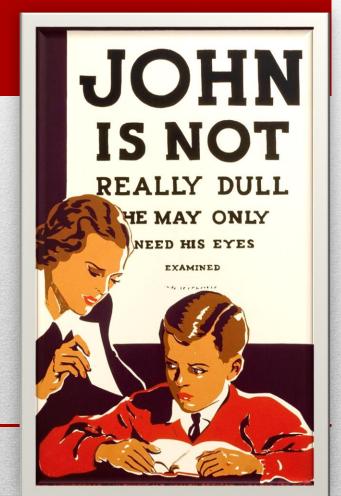
# Instruments Vetted by NCCVEH Include:







# Beginning at Age 3 Years



## 2 Approaches to Vision Screening

### 1. Optotype-based screening

- Tests of visual acuity using optotypes to measure visual acuity as interpreted by the brain
  - Quantifiable measurement of the sharpness or clearness of vision when identifying specific optotype sizes at a standardized distance

### 2. <u>Instrument-based screening</u>

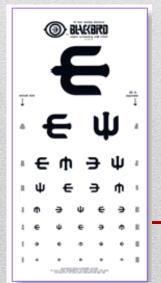
- Instruments do not measure visual acuity
- Instruments use an automated image acquisition and analysis system of the eyes to provide information about amblyopia risk factors:
  - Estimates of significant refractive error (hyperopia, myopia, astigmatism)
  - Estimates of anisometropia
  - Estimates of eye misalignment (some, not all)





## "Not so great" charts . . .

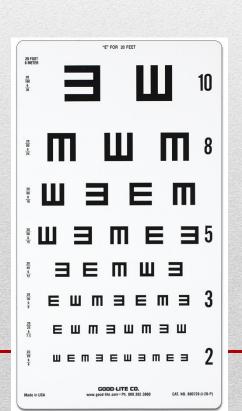


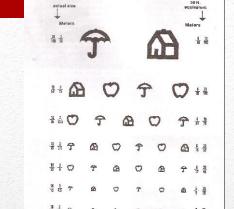




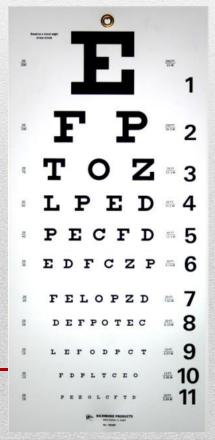








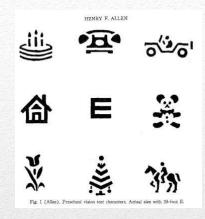
SYMBOLS FOR 10 FEET



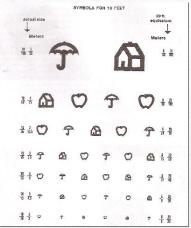
### **NOT** Recommended by NCCVEH and/or AAP



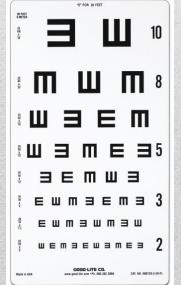
"Sailboat"



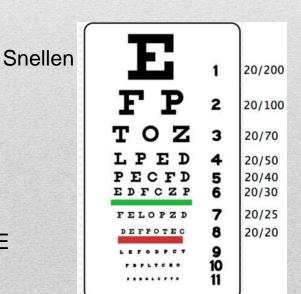
Allen Pictures



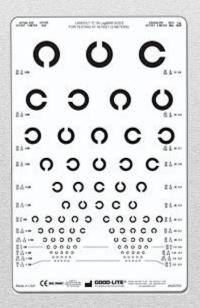
Lighthouse or "House, Apple, Umbrella"



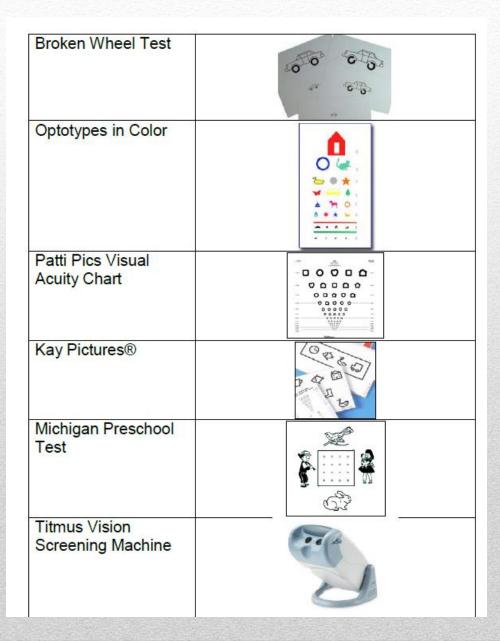
Tumbling E



Landolt C



## More Charts NOT Recommended by NCCVEH



https://nationalcenter.prevent blindness.org/sites/default/file s/national/documents/Charac teristics\_of\_Visual\_Acuity\_Ch arts\_for\_Screening\_Children \_Revised\_9.27.17.pdf

https://nationalcenter.preventb lindness.org/programs-andresources

## Why NOT Recommended?

- The use of validated and standardized optotypes and acuity charts is important for an accurate assessment of vision.
- Charts not standardized.

- Children may not know their letters.
- Requires discrimination of direction, which is not sufficiently developed in preschool-aged children.
- Not well validated in screening environment.

Cotter, S. A., Cyert, L. A., Miller, J. M., & Quinn, G. E. for the National Expert Panel to the National Center for Children's Vision and Eye Health. (2015). Vision screening for children 36 to <72 months: Recommended practices. *Optometry and Vision Science*, *92*(1), 6-16. Retrieved from <a href="http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4274336/pdf/opx-92-06.pdf">http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4274336/pdf/opx-92-06.pdf</a>

Donahue, S. P., Baker, C. N., & AAP Committee on Practice and Ambulatory Medicine, AAP Section on Ophthalmology, American Association of Certified Orthoptists, American Association for Pediatric Ophthalmology and Strabismus, American Academy of Ophthalmology (2016). Procedures for the evaluation of the visual system by pediatricians. *Pediatrics*, *137*(1), e20153597. Retrieved from <a href="http://pediatrics.aappublications.org/content/pediatrics/early/2015/12/07/peds.2015-3597.full.pdf">http://pediatrics.aappublications.org/content/pediatrics/early/2015/12/07/peds.2015-3597.full.pdf</a>

## Importance of Appropriate Tools

- "Visual acuity scores can be significantly affected by the chart design." (p. 1248)
  - Bailey, I.L. (2012). Perspective: Visual acuity Keeping it clear. *Optometry and Vision Science*, 89(9), 1247-1248.

## National and international distance visual acuity eye chart design recommendations

- 1980 National Academy of Sciences-National Research Council (NAS-NRC)
  - Committee on Vision. (1980). Recommended standard procedures for the clinical measurement and specification of visual acuity. Report of working group 39. Assembly of Behavioral and Social Sciences, National Research Council, National Academy of Sciences, Washington, DC. Advances in Ophthalmology, 41:103–148.
- 1984 International Council of Ophthalmology (ICO)
  - www.icoph.org/dynamic/attachments/resources/icovisualacuity1984.pdf
- 2003 World Health Organization Prevention of Blindness & Deafness (wно)
  - Prevention of blindness and deafness. Consultation on development of standards for characterization of vision loss and visual functioning. Geneva: WHO;2003 (WHO/PBL/03.91).
- 2010 American National Standards Institute, Inc.
  - ANSI Z80.21-1992 (R2004) Approved May 27, 2010

Optotypes approximately equal in legibility

Horizontal between-optotype spacing = 1 optotype width

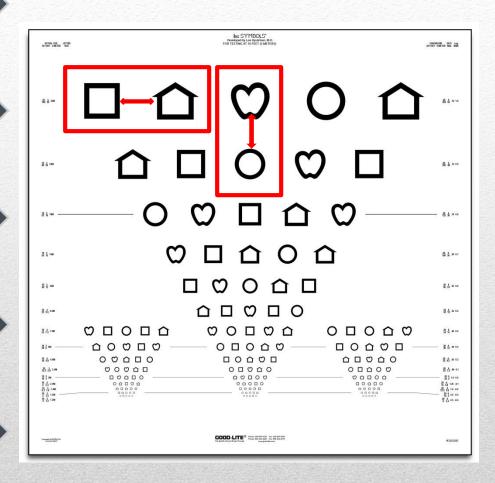
Vertical between-line spacing = height of next line down

Geometric progression of optotype sizes of 0.1 log units (logMAR, ETDRS)

5 optotypes per line

Optotypes black on white background with luminance between 80 cd/m<sup>2</sup> and 160 cd/m<sup>2</sup>

## Similar recommendations across guidelines

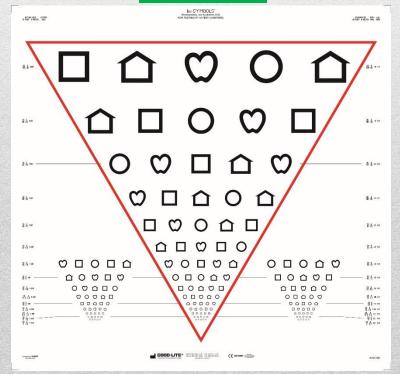


Design guidelines = "ETDRS" or "logMAR" chart

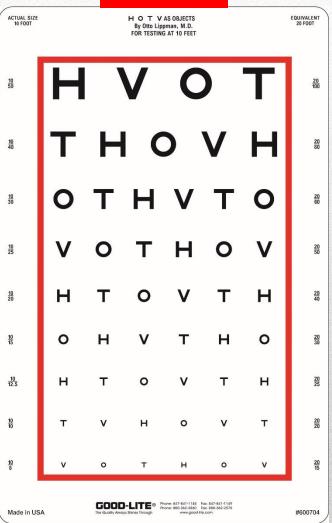
## Tips:

- Line outside optotypes
- 20/32 vs. 20/30
- 10 feet vs. 20 feet





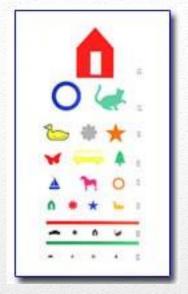


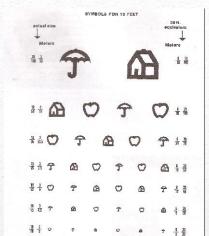


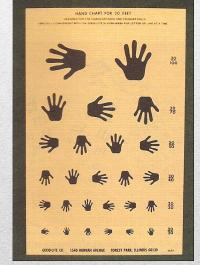
Do the following eye charts fit national/international eye chart design guidelines?



Yes or No? ✓NO



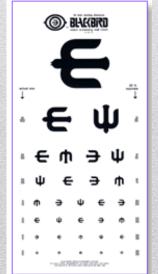








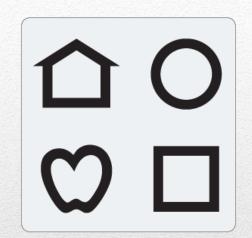




## Preferred Optotypes for Ages 3 to 6 Years

NCCVEH

AAP





 Recommend LEA SYMBOLS® and HOTV letters as optotypes

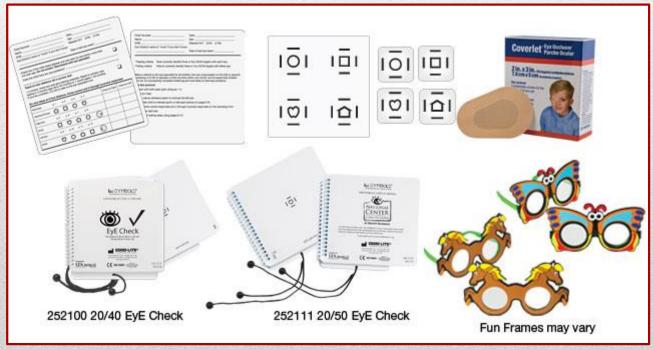
Cotter, S. A., Cyert, L. A., Miller, J. M., & Quinn, G. E. for the National Expert Panel to the National Center for Children's Vision and Eye Health. (2015). Vision screening for children 36 to <72 months: Recommended practices. *Optometry and Vision Science*, 92(1), 6-16. Retrieved from <a href="http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4274336/pdf/opx-92-06.pdf">http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4274336/pdf/opx-92-06.pdf</a>

Donahue, S. P., Baker, C. N., & AAP Committee on Practice and Ambulatory Medicine, AAP Section on Ophthalmology, American Association of Certified Orthoptists, American Association for Pediatric Ophthalmology and Strabismus, American Academy of Ophthalmology (2016). Procedures for the evaluation of the visual system by pediatricians. *Pediatrics*, 137(1), e20153597. Retrieved from <a href="http://pediatrics.aappublications.org/content/pediatrics/early/2015/12/07/peds.2015-3597.full.pdf">http://pediatrics.aappublications.org/content/pediatrics/early/2015/12/07/peds.2015-3597.full.pdf</a>

## Preferred Optotype Format

NCCVEH national guidelines call for using single, LEA SYMBOLS® or HOTV letter optotypes surrounded with crowding bars for children ages 3, 4, and 5 years at 5 feet





Cotter, S. A., Cyert, L. A., Miller, J. M., & Quinn, G. E. for the National Expert Panel to the National Center for Children's Vision and Eye Health. (2015). Vision screening for children 36 to <72 months: Recommended practices. *Optometry and Vision Science*, 92(1), 6-16. Retrieved from <a href="http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4274336/pdf/opx-92-06.pdf">http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4274336/pdf/opx-92-06.pdf</a>

## Options: Critical Line Screening at 10 feet

### Sight Line Kit





Cotter, S. A., Cyert, L. A., Miller, J. M., & Quinn, G. E. for the National Expert Panel to the National Center for Children's Vision and Eye Health. (2015). Vision screening for children 36 to <72 months: Recommended practices. *Optometry and Vision Science*, 92(1), 6-16. Retrieved from <a href="http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4274336/pdf/opx-92-06.pdf">http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4274336/pdf/opx-92-06.pdf</a>

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## Also acceptable . . .





https://www.schoolhealth.com/eyespy-20-20-vision-screener Using HOTV letters – NOT Landolt C

## Screening Distance

- 10 feet from chart to child's eyes
- New, standardized distance charts will be at 10 feet for children and adults

10/xx on left side of chart with 20/xx on right side – report 20/xx





## **Unacceptable**

## Occluders Ages 3, 4, and 5 years

Hand



Tissue



Paper or plastic cup



Cover paddle



Why unacceptable?

 Children can easily peek

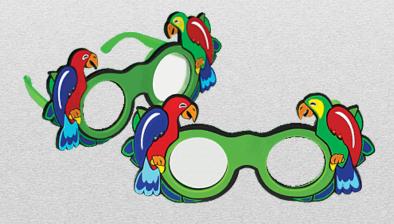


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## Occluders – Younger Children <10 Years









# To Point or Not to Point . . . ?

 Pointing to each optotype to help children know where they are on the chart is permissible.

☐ True or False?

## **√**False

 1.8 "Line-by-line isolation or pointing may be used, but not letter by letter

World Health Organization (2003). Consultation on development of standards for characterization of vision loss and visual functioning. Geneva: Switzerland. Retrieved from

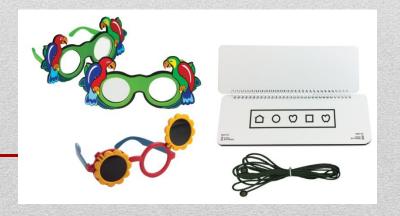
http://apps.who.int/iris/bitstream/10665/68601/1/WHO\_PBL\_03.91.pdf



## No Pointing at Optotypes

- Holding pointer at optotype makes optotype easier to identify.
- Instead . . . briefly point under or over top of optotype and <u>quickly</u> remove pointer.
- If line has a box around optotypes, stay outside the box with pointer.





- "Untestable" is not a failed vision screening.
- Keep track of "untestable" children.
- Untestable children in VIP study were 2x as likely to have vision problems than those who passed vision screening.

- ➤ If possible, rescreen untestable children same day.
- ➤ If you have reason to believe that the child may perform better on another day, consider rescreening the child no later than 6 months.

Vision in Preschoolers Study Group. (2007). Children unable to perform screening tests in Vision in Preschoolers Study: Proportion with ocular conditions and impact on measure of test accuracy. *Investigative Ophthalmology & Visual Science, 48*(1), 83-87.

American Academy of Ophthalmology Pediatric Ophthalmology/Strabismus Panel. (2012). Preferred Practice Pattern® Guidelines. Amblyopia. San Francisco, CA: American Academy of Ophthalmology. Retrieved from <a href="https://www.aao.org/preferred-practice-pattern/amblyopia-ppp--september-2012">https://www.aao.org/preferred-practice-pattern/amblyopia-ppp--september-2012</a>

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## Referral Criteria

### **NCCVEH**

- Age <u>3 years</u>:
  - Majority of optotypes on 20/50 line
- Ages <u>4 and 5 years</u>:
  - Majority of optotypes on 20/40 line
- Ages <u>6 years and older</u>:
  - Majority of optotypes on 20/32 line

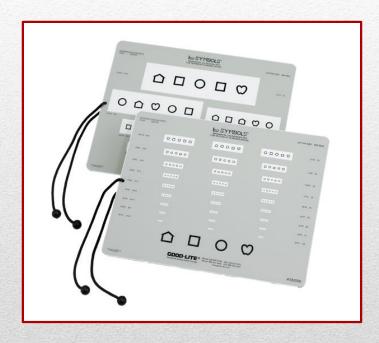
### AAP

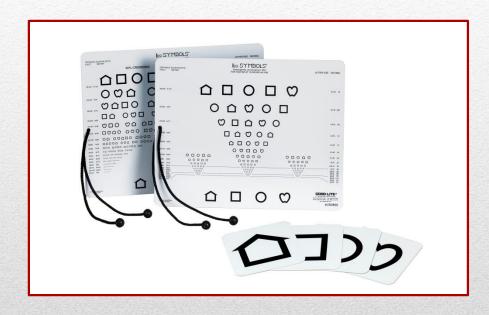
- Age <u>3 years</u>:
  - Majority of optotypes on <u>20/50 line</u>
- Ages <u>4 years</u>:
  - Majority of optotypes on <u>20/40 line</u>
- Ages <u>5 years and older</u>:
  - Majority of optotypes on <u>20/32</u> (or 20/30) line
  - Or 2-line difference even in passing lines (i.e., 20/20 and 20/32)

Cotter, S. A., Cyert, L. A., Miller, J. M., & Quinn, G. E. for the National Expert Panel to the National Center for Children's Vision and Eye Health. (2015). Vision screening for children 36 to <72 months: Recommended practices. *Optometry and Vision Science*, 92(1), 6-16. Retrieved from <a href="http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4274336/pdf/opx-92-06.pdf">http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4274336/pdf/opx-92-06.pdf</a>

Donahue, S. P., Baker, C. N., AAP Committee on Practice and Ambulatory Medicine, AAP Section on Ophthalmology, American Association of Certified Orthoptists, American Association for Pediatric Ophthalmology and Strabismus, American Academy of Ophthalmology (2016). Procedures for the evaluation of the visual system by pediatricians. *Pediatrics*, 137(1), e20153597. Retrieved from <a href="http://pediatrics.aappublications.org/content/pediatrics/early/2015/12/07/peds.2015-3597.full.pdf">http://pediatrics.aappublications.org/content/pediatrics/early/2015/12/07/peds.2015-3597.full.pdf</a>

## **Choices for Near Vision Screening**





Can do critical line only with both eyes open or one eye at a time.

## Stereoacuity Screening if NOT Using Instrument



PASS 2 Smile Test

## If Doing Color Vision Deficiency Screening . . .



## 2 Approaches to Vision Screening

- 1. Optotype-based screening
- Tests of visual acuity using optotypes to measure visual acuity as interpreted by the brain
  - Quantifiable measurement of the sharpness or clearness of vision when identifying specific optotype sizes at a standardized distance

### 2. Instrument-based screening

- Instruments do not measure visual acuity
- Instruments use an automated image acquisition and analysis system of the eyes to provide information about amblyopia risk factors:
  - Estimates of significant refractive error (hyperopia, myopia, astigmatism)
  - Estimates of anisometropia
  - Estimates of eye misalignment





## **Instrument-Based Screening**

 Use instruments <u>OR</u> tests of visual acuity for children ages 3, 4, and 5 years (NCCVEH and AAP)



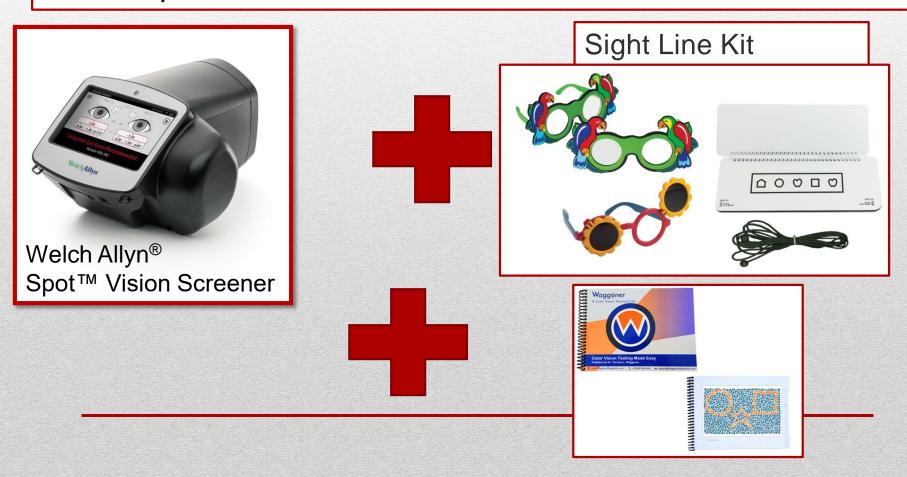




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- Instruments typically will not capture readings on 100% of children (e.g., 97%).
- If doing instrument-based screening, still want optotype-based screening tool . . . just in case for other 3%.
- Example . . .



## Vision Screening is . . .

- Part of a process...not a single event.
- 1 of 12 components of a strong vision health system of care.



## Evaluating Your Vision Health Program

### Annual Vision Health Program Evaluation Checklist

Instructions: Review each component described below. Select the "Yes", "No", or other response that
best describes your vision health program as it currently operates. Please note comments in the area
indicated. Once you have responded to the questions in each of the components proceed to the "Vision
Health System Action Plan" located on page 7 to identify areas for attention or improvement in your

 Our program ensures that all parents/caregivers receive educational material, which respects cultural and literacy needs, about the importance of:

a. Good vision for their child now and in the future.

Evaluation Date: Completed By:

program.

- b. Scheduling and attending an eye exam when their child does not pass vision screening.
- c. Increased risk for vision problems in defined high-risk populations.

Check Yes or No	Point of evaluation				
Yes No	We have vision health information in <u>all</u> native languages of the families that we serve.				
Yes No	We discuss the importance of healthy vision as a part of proper child development in the general health information provided by our program.				
Yes No	We provide parents with easy-to-understand* information on the visual milestones for children at all stages of life.  *Information is written at an appropriate reading level, provides graphics as well as descriptions, and has been tested for ease of understanding.				
Yes No	Our parent/and or health advisory committee(s) have reviewed our vision health information for, content, clarity of instruction, cultural literacy, and reading level (4 <sup>th</sup> to 6 <sup>th</sup> grade level.)				
Yes No	We provide health information to parents of children with special healthcare needs that describe their increased risk for vision problems.				
Yes No	We have active Parent and Health Advisory Committees				

12-Components of a Strong Vision Health System of Care





#### Our Children's Vision Health System Action Plan

**Directions:** Review your responses from the program evaluation form and the notes written for each item. In all areas where "no" was the response selected, or your notes indicate a need for improvement, establish the next steps your program will take to improve efforts in that area. Once all responses have been accounted for, establish your top three priorities out of your needed actions, a date to review progress, and a completion date.

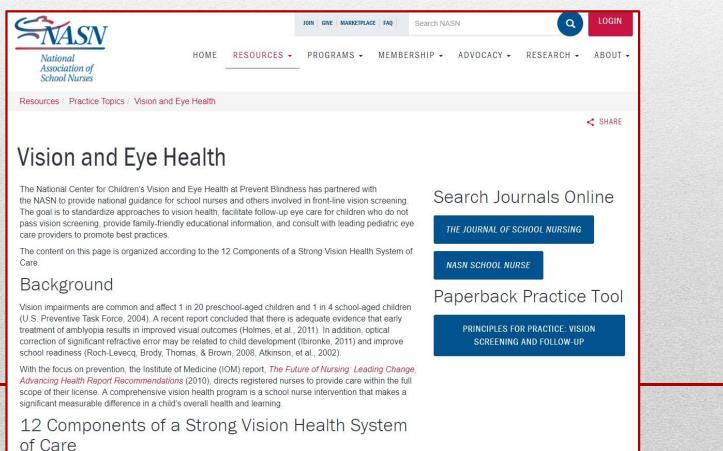
Needed action	ons:			
Priority #1:_				
Priority #2:_				
Priority #3:_				

Visit http://nationalcenter.preventblindness.org/year-childrens-vision for information and resources that will help you improve your vision health program.

### NASN Vision and Eye Health Resource

## (National Center for Children's Vision and Eye Health and NASN partnership)

https://www.nasn.org/nasn-resources/practice-topics/vision-health





http://nationalcenter.preventbli ndness.org/publications-andpresentations



Publications, Presentations and Videos

Professional and educational resources for children's vision and eye health

Presentations

- · Parents as Teachers Conference December 2017
- Annual Virginia School Nurses Association Conference November 2017
- Northwest Indian Head Start Coalition Training Conference August 2017
- Oklahoma Indian Head Start Directors Association Conference August 1, 2017

Reports and Information from Prevent Blindness

- Results from 2016 National Survey of Children's Health (NSCH)
- A complete list of public health reports available from Prevent Blindness
- Children's Vision and Eye Health: A Snapshot of Current National Issues
- . Eye health and safety information
- Our Vision for Children's Vision, A National Call to Action for the Advancement of Children's Vision and Eye Health
- Prevent Blindness Statement on School-Aged Vision Screening and Eye Health Programs
- 18 Vision Development Milestones From Birth to Baby's First Birthday
- 18 Vision Development Milestones From Birth to Baby's First Birthday (SPANISH)



Provider education tools

Parent/ family resources



Technical assistance



Professional Development



Communication tools

http://nationalcenter.preventblindness.org

### THINK OF VISION

### **Guide for Preschool Teachers**

A young child does not know how they should see and cannot tell us about their vision. One or two children in every preschool classroom will have a vision disorder that, left unidentified and untreated, could interfere with their development and acquisition of early literacy skills. As a preschool teacher, you can support the vision of the children you teach.

If you repeatedly observe a preschooler exhibiting one or several of these signs, THINK OF VISION. Ask the parent, school nurse, or health manager for the child to receive a vision screening or comprehensive eye exam from an eye doctor:

#### APPEARANCE:

- » Eyes are crusty, red, watery, inflamed or don't line up
- » Eye turn, wandering eye, droopy eyelid

#### BEHAVIORS:

- » Squints, frowns, rubs eyes or blinks frequently
- » Body rigid, or thrusts head forward or backward when looking at distant objects
- » Avoidance of eye contact
- » Extreme shyness, poor social interaction
- » Easily distractible/unable to focus or maintain attention
- » Avoids playing outside or joining in games
- » Difficulty coordinating hand/eye movements (e.g., picking up objects)
- » Clumsy, bumps into things

#### WHEN READING, WRITING OR DOING **CLOSE-UP WORK:**

- » Poor letter or word recognition
- » Difficulty completing a letter or symbol
- » Rereads, skips lines, or loses place often
- » Closes one eye when doing near work
- » Tilts or turns head, or lays head on desk
- » Falls asleep while reading
- » Loses interest quickly
- » Seems cranky when doing near tasks
- » Holds books or objects close to face

#### **ENROLLMENT IN PROGRAMS:**

A comprehensive eye exam from an eye doctor should be part of the evaluation process if a child:

- » Is enrolled in Early Intervention
- » Is enrolled in a Special Education program
- » Will receive an I.E.P. in school
- » Has developmental delays

Most childhood vision disorders are treated by wearing prescription eyeglasses. To allow a preschooler the opportunity to enjoy play and learning, gain skills, and reach their fullest potential, the child needs to follow the eye doctor's treatment plan.

Teachers can help by understanding how the child's prescribed treatment should be applied in the classroom, and reinforcing and encouraging children and parents with adherence.



Open Eyes, Open Doors,

Visit childrensvisionmassachusetts.org for more information.





https://childrensvision .preventblindness.org /sites/default/files/THI NK%20OF%20VISIO N%2011-8-18.pdf

### VISION SCREENING FACT SHEET





Parents<sup>1</sup> and early care and education staff cannot always tell when a child has trouble seeing. Observation alone isn't enough. This is why implementing evidence-based vision screening throughout early childhood is important.

#### Introduction

Children use all their senses to learn. Children's play with puzzles, crayons, balls, and blocks can improve important visual skills. These skills contribute to a child's school readiness. An uncorrected vision problem can be a barrier to this readiness.

Timely vision screening (coupled with an eye examination<sup>2</sup> when indicated) is an important step toward early detection of any possible vision problems. Early detection can lead to an effective intervention and help to restore proper vision. Young children rarely complain when they can't see well because to them, it's normal.

### Evidence-based Vision Screen

Evidence-based is an umbrella term that use of the best research evidence (found sciences literature) and clinical expertise health care providers know).

Adapted from the National Institutes of I https://prevention.nih.gov/resources-for dissemination-and-implementation-reso evidence-based-programs-practices

An evidence-based vision screening is a videntify children who need an evaluation vision and eye health. Head Start and Ear Start programs are required to obtain or pevidence-based vision screening.

- 45 CFR §1302.42 Child health status and 3) Ensuring up-to-date child health statu
- (2) Within 45 calendar days after the chi attends the program or, for the homebas option, receives a home visit, a program either obtain or perform evidence-based hearing screenings.
- (3) If a program operates for 90 days or l days from the date the child first attends to satisfy paragraphs (b)(1) and (2) of th

https://eclkc.ohs.acf.hhs.gov/policy/45-c xiii/1302-42-child-health-status-care.

Health managers may begin by looking at most recent physical for the date and resu

### Pruebas de la vista: Ficha técnica de los programas de educació y cuidado tempranos

Updated Spanish
Fact Sheet
coming soon

### Introducción

os nifios usan todos sus sentidos para aprender. Jugar con rompeca bezas, crayones, pelotas y bloques puede mejorar las habilidades visuales importantes. Estas habilidades contribuyen con la preparación escolar de los nifios. Un problema de la vista sin corregir puede ser una barrera para esta preparación.

Las pruebas de la vista realizadas de manera oportuna (junto con un examen ocular¹ cuando se indica) son un paso importante hacia la detección temprana de cualquier problema de la vista posible. La detección temprana también puede contribuir a una intervención eficzz y a restaurar una visión adecuada. Los programas Head Starty Early Head Start, en colaboración con los padres de familia,² deben cumplir con el requisito de realizarles pruebas de la vista a los niños en un plazo de 45 días naturales desde la entrada del niño al programa, o de obtener los resultados de las pruebas de la vista en ese plazo (30 días para programas de menor duración)².

Los administradores de salud pueden comenzar por observar el examen físico más reciente y los resultados de una prueba de la vista del niño. Muchos programas también deciden realizar sus propias pruebas de la vista. Algunas razones pueden ser las siguientes:

- El nifio fue poco cooperativo para la realización de una prueba anterior.
- Los resultados de la prueba de la vista del nifio no se encuentran disponibles.
- Un familiar o un miembro del personal informan una inquietud respecto de la vista del nifio.
- El Comité Asesor de los Servicios de Salud.



Los programas pueden realizar pruebas de la vista en cualquier momento, como antes o durante las primeras semanas de un nuevo año del programa cuando muchos niños ingresan al mismo tiempo. El personal o los voluntarios capacitados pueden realizar pruebas de la vista. Los programas pueden comunicarse con Prevent Blindness, que tiene un programa de capacitación y certificación sobre pruebas de la vista. Prevent Blindness y sus filiales ponen a disposición esta capacitación. Otros grupos comunitarios calificados también pueden realizar pruebas de la vista empíricas según la edad. Algunos programas han trabajado con grupos comunitarios voluntarios como los siguientes:

- Clubes de Leones
- Organizaciones estatales o comunitarias
- Escuelas de medicina o programas de capacitación oftalmológica

### Download at:

https://eclkc.ohs.acf.hhs.gov/physicalhealth/article/vision-screening imólog o diagnestica en alquier afección o enformedad de la vista y establece un tratamiento. Sa las personas que puedan tener una función de crianza en la vida de un niño, como las abudes que cumplan la función de brindarle enidados, y las padres de acogida. Lel niño entra al aula o comienza a participar en una opción de programa de cuidado infanti familiar.

La preparación para la escuela empieza con la salud.

### Year of Children's Vision

- http://nationalcenter.preventblindness.org/yearchildrens-vision
- Archived vision screening webinars in Resources



## Resources to Support Families . . .

### Financial Assistance Information

### Association of Schools and Colleges of Optometry

6110 Executive Boulevard, Suite 510 Rockville, Maryland 20852 Phone: (301) 231-5944 Face (301) 770-1828 www.opted.org

Many optometry schools offer lowcost care to people willing to be treated by supervised students. They may also provide free care to people who loin research studies.

#### Chronic Disease Fund 6900 N. Dallas Parkway, Suite 200

Plano, TX 75024 Toll-free Patient Info: (877) 968-7233 Main: (972) 608-7141 www.cdfund.org

Chronic Disease Fund\* is an independent 501 (c/g) non-profit charitable organization helping patients with chronic disease, cancers or life-akering conditions obtain the expensive medications they nead.

#### Fax: (415) 561-8567 www.eyecareamerica.org

EyeCare America provides eye care to US citizens and legal residents through volunteer ophthalmologists (Eye M.D.s) at no cost to those who qualify. Go to the website or call to find out if you qualify for eye care. EyeCare America facilitates eye care for U.S. citizens or legal residents who are without an Eye M.D. and who do not belong to an HMO or do not have eye care coverage through the Veterans Administration.

• Those who are age & or older and who have not seen an EyeMD in three or more years may be eligible to receive a comprehensive, medical eye exam and up to one year of care at no out-of-pocket cost for any disease diagnosed during the initial exam. Volunteer ophthalmologists will wave co-payments, accepting Medicare and for other insurance reliabursement as payment in full: patients without insurance receive this care at no charge.



211 West Wacker Drive Suite 1700 Chicago, Illinois 60606 800.331.2020 PreventBlindness.org



Financial Assistance Programs



Tips for Wearing Eye Glasses <a href="https://www.preventblindness">https://www.preventblindness</a>

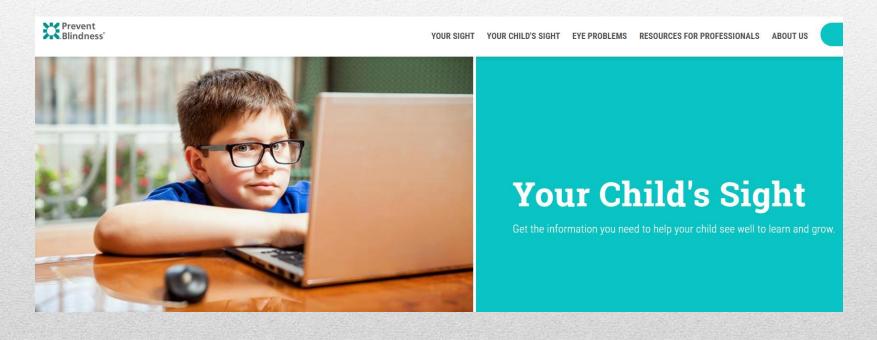
.org/your-childs-glasses

**Parent Education** 

http://nationalcenter.preventblindness.org/resources-2

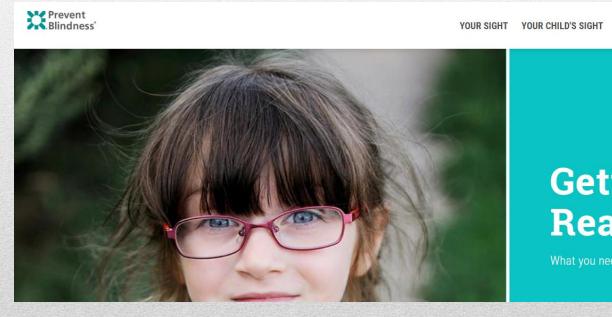
## Information about Your Child's Sight from Prevent Blindness

https://www.preventblindness.org/your-childs-sight



### **Getting Your Child Ready for School:**

https://www.preventblindness.org/getting-your-child-ready-school



Getting Your Child Ready for School

RESOURCES FOR PROFESSIONALS

**FYF PROBLEMS** 

What you need to know to help your child see well to grow and learn.

## Call to Action

- □Screen vision when you see behavior and "academic" challenges.
- □ Evaluate your vision and eye health program annually.
- □ Help ensure follow-up to eye care when children do not pass vision screening.



### Raise your hand if:

- You learned something new today.
- You found this presentation helpful.
- You will make at least 1 change in your vision health program.



## Thank you for your TIME and ATTENTION. . .



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