Vision Screening: Relationship Between Behavior and Classroom Challenges & Undetected and Uncorrected Vision Disorders

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Info You Will Take Home …

4 Learning Objectives

List 1 website for finding resources to support your vision and eye health program.

Describe 2 evidence-based methods for screening vision.

Describe 3 common behaviors that may be related to poor vision.

Describe 3 positive outcomes in learning and behaviors after vision screening, eye examination, and prescription glasses.
Current State of Children’s Vision in the U.S.

Vision disorders requiring treatment impact up to 1 in 17 of preschool-aged children in the United States.\textsuperscript{a}

- Eye and vision disorders in children are a time-sensitive concern.
- If left undiagnosed and untreated, eye diseases and vision disorders in children can lead to permanent and irreversible vision loss and/or cause problems socially, academically, and developmentally.
- Nearly 94% of the vision problems leading to the impairment in preschool-aged children can be identified early during a vision screening resulting in earlier access to an eye care provider and improvement in vision.\textsuperscript{b}
- Only 41% of children ages 5 years and younger are screened for vision problems.\textsuperscript{c}


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.
## 7 Classroom Behaviors

1. Talking in class
2. Notably quiet in class
3. “Spacey” children in their own world
4. Difficulty sitting still
5. Frustrated with academic work
6. Squinting during class activities
7. Clumsiness
**Talking in class** – Child said he talked because he was asking other students to help him read material on board.

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

**“Spacey” and in own world** – Interrupt story time to come forward to see book pictures. “I can see that now!”

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

**Frustrated with “academic work” –**
Before glasses, “things looked dusty”. Different child, happier, less frustrated.

**Squinting during class activities –**
“Mommy! There are numbers on that circle on the wall!”

**Clumsiness until receiving glasses –**
“I have realized through these screenings that vision can affect a child’s behavior, balance, and academic performance.”


Screener and parent stories.
“Academic” Challenges
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!"
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, which assesses the ability to identify letters and written words

Test = TOPEL (Test of Preschool Early Literacy)

Full vision - http://www.onedollarglasses.org/eye-test/full-vision.html
Vision defect of 4.0 D - http://www.onedollarglasses.org/eye-test/4-diopters.html
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 2nd and 3rd 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

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.

First grade reading ability found to be predictive of 11th grade reading outcomes, including:

- Reading comprehension,
- Vocabulary, and
- General knowledge.

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

“I always thought I was just sitting too far from the blackboard to read the words and numbers the teachers were writing. It wasn’t until my 8th grade year (having repeated 6th grade) that I was vision tested. Geez, what a difference when I went back to school as a freshman in high school. I could read everything, and my learning was so much easier.”
What do previous slides tell you?

• Importance of:
  
  • Evidence-based vision screening,
  
  • Follow-up eye exams,
  
  • Receiving vision treatment plan and related devices/materials (i.e., glasses, patching); and
  
  • Following treatment plan for best vision now and in the future.
Four Steps to Simple Solution
Such a simple solution . . .
# 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
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 (some, not all)
“Not so great” charts . . .
NOT Recommended by NCCVEH and/or AAP

“Sailboat” by Allen Pictures

Lighthouse or “House, Apple, Umbrella”

Snellen

Tumbling E

Landolt C
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.

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Importance of Appropriate Tools

• “Visual acuity scores can be significantly affected by the chart design.” (p. 1248)

• Excluding optotype size, “each visual acuity level on a test chart should present an essentially equivalent task”. (p. 740)
National and international distance visual acuity eye chart design recommendations

• 1980 - National Academy of Sciences-National Research Council (NAS-NRC)

• 1984 - International Council of Ophthalmology (ICO)
  • www.icoph.org/dynamic/attachments/resources/icovisualacuity1984.pdf

• 2003 - World Health Organization Prevention of Blindness & Deafness (WHO)
  • 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/m² and 160 cd/m²

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

[Images of various eye charts are shown, illustrating the diversity of designs available.]
Preferred Optotypes for Ages 3 to 6 Years

- NCCVEH
- AAP

- Recommend LEA SYMBOLS® and HOTV letters as optotypes


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.

Options: Critical Line Screening at 10 feet

Sight Line Kit


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
Occlusion:
Children likely to peek when given responsibility for covering their eyes during vision screening.
Unacceptable Occluders Ages 3, 4, and 5 years

- Hand
- Tissue
- Paper or plastic cup
- Cover paddle

Why unacceptable?

Children can easily peek

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

No Pointing at Optotypes

• Holding pointer at optotype makes optotype easier to identify.

• *Instead . . . briefly point under or over top of optotype and quickly 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.


Referral Criteria

NCCVEH

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

AAP

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


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 Spot

PASS 2 Smile Test
If Doing Color Vision Deficiency Screening . . .
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2. **Instrument-based screening**
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       - Estimates of significant refractive error (hyperopia, myopia, astigmatism)
       - Estimates of anisometropia
       - Estimates of eye misalignment
Instrument-Based Screening

• Use beginning at 12 months (AAP)

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


Instruments Vetted by NCCVEH

- Welch Allyn® Spot™ Vision Screener
- Welch Allyn® SureSight™ Vision Screener
- Retinomax (Right Mfg. Co Ltd.-Tokyo, Japan)
- Plusoptix S12C Vision Screener
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**

**Evaluation Date:** __________  **Completed By:** ____________________________

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 program.

1. 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.
   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.

<table>
<thead>
<tr>
<th>Check Yes or No</th>
<th>Point of evaluation</th>
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| 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 (4th to 6th 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 actions:**

- 
- 
- 

**Priority #1:**

**Priority #2:**

**Priority #3:**

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

https://www.nasn.org/nasn-resources/practice-topics/vision-health
Vision and Eye Health

The National Center for Children’s Vision and Eye Health at Prevent Blindness has partnered with the NASN to provide national guidance for school nurses and others involved in front-line vision screening. The goal is to standardize approaches to vision health, facilitate follow-up eye care for children who do not pass vision screening, provide family-friendly educational information, and consult with leading pediatric eye care providers to promote best practices.

The content on this page is organized according to the 12 Components of a Strong Vision Health System of Care.

Background

Vision impairments are common and affect 1 in 20 preschool-aged children and 1 in 4 school-aged children (U. S. Preventive Task Force, 2004). A recent report concluded that there is adequate evidence that early treatment of amblyopia results in improved visual outcomes (Holmes, et al., 2011). In addition, optical correction of significant refractive error may be related to child development (Bironka, 2011) and improve school readiness (Roch-Leveque, Brody, Thomas, & Brown, 2008, Atkinson, et al., 2002).

With the focus on prevention, the Institute of Medicine (IOM) report, The Future of Nursing: Leading Change, Advancing Health Report Recommendations (2010), directs registered nurses to provide care within the full scope of their license. A comprehensive vision health program is a school nurse intervention that makes a significant measurable difference in a child’s overall health and learning.

12 Components of a Strong Vision Health System of Care

Search Journals Online

- The Journal of School Nursing
- NASN School Nurse

Paperback Practice Tool

- Principles for Practice: Vision Screening and Follow Up
Resources . . .
THINK OF VISION
Guide for Preschool Teachers

A young child does not know how to 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.

Visit childrensvisionmassachusetts.org for more information.
CHILDREN’S VISION AND EYE HEALTH:
A Snapshot of Current National Issues

Helpful info and statistics for grant proposal writing . . .

Call to Action

- Screen vision when you see behavior and “academic” challenges.
- Evaluate your vision and eye health program.
- 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...