Why Johnny and Jane Can’t Focus in the Classroom: Vision Disorders, Learning Problems, and Vision Screening

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Introduction and Disclaimer
• 16 years in vision screening field
• Former Director/Lead Trainer – Vision Initiative for Children – West Virginia University Eye Institute
• Member – Advisory Committee to the National Center for Children’s Vision and Eye Health at Prevent Blindness
• Consultant – Vision Screening Committee, American Association for Pediatric Ophthalmology and Strabismus
• Current Education and Outreach Coordinator for the National Center for Children’s Vision and Eye Health at Prevent Blindness
• Current Director – Vision and Eye Health Initiatives at Good-Lite and School Health Corporation
• Not in sales . . . Focus is encourage age-appropriate, evidence-based, and best practice vision screening as part of a strong, 12-component, Vision Health System of Care

Info You Will Take Home …
4 Learning Objectives

List 3 classroom behaviors that could be related to vision disorders.
List 2 evidence-based approaches to vision screening and describe what each measures.
Describe the relationship between undetected vision disorders and learning challenges.
Provide the answer to this question: Is pointing to optotypes when screening vision appropriate?
Behaviors should not be used as a checklist.

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 casual factor.

1 – Talking During Learning Activity

Dr. Gallin described child who received reprimands for talking in class.

After vision screening + eye exam + glasses, he was no longer disruptive.

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


2 - Notably Quiet in Class

Dr. Gallin described child who was notably quiet in class:

Child explained she stopped looking at the board . . . Because she couldn’t read material on board.

3 – “Spacy” and In Own World

Amelia “seemed sort of spacey, as if she were in her own little world, usually a step behind the other students. She would often interrupt story time to come forward and peer at the pictures in the book.”

Vision screening + eye exam + glasses.

Then . . .

“The cutest moment was when she and a friend were walking hand-in-hand around the playground. He was pointing out different things to her, and she would excitedly exclaim ‘I can see that now!’ Amelia is now very aware and an active participant of everything that is happening in the classroom and will truly be ready for kindergarten!”

Story from West Virginia Head Start employee.

4 – Difficulty Sitting Still

This Mom had concerns about the vision of her younger son because he was always up and moving, not sitting in her lap and listening when she read a book, not watching TV with his brother.

Vision screening + eye exam + glasses.

Momma said glasses made an incredible difference for her son. Now, he sits in her lap while she reads a book from start to finish. Now, he watches cartoons with his brother without running around the room.

At age 4, he is achieving greater success at his daycare. Before the vision screening and eye glasses, he was “up and moving” during circle time. “He was kind of a loner before. He would get bored.” Now he sits and participates in group activities.

Story from West Virginia parent.

5 – Frustrated with “Academic Work”

“After he received his glasses, he was like a different child. He seemed happier and less frustrated.

Before his glasses, he would become frustrated trying to write his letters or draw.

Now he likes to work on his letters.”

The child said, before glasses, “things looked dusty”.

Story from West Virginia parent and child.
6 - Squinting

Sally, who squinted in circle time activities, failed initial screening and rescreening.

Sally’s mom immediately made an appointment for a full eye exam.

Vision screening + eye exam + glasses.

Sally does not have to squint when she is in circle time doing activities such as calendar or weather chart.

Story from West Virginia Head Start employee.

7 – Clumsiness

“I remember clearly one of the first vision screenings I completed. It was on a little girl who we had already realized was very clumsy.

She was prescribed very strong lenses and we immediately realized that her vision was the reason for her clumsiness.

I have realized through these screenings that vision can affect a child’s behavior, balance, and academic performance.”

Story from West Virginia Head Start employee.

MULTISTATE LEVEL

- 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

MULTIPLE INNER CITY SCHOOLS LEVEL:

Ongoing

- 317 2nd and 3rd grade students in 12 high-poverty schools in Baltimore City School District in phase 1
- Most common eye exam findings: refractive errors (hyperopia, myopia, astigmatism)
- 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.


Individual Child Level

- 5th grade student
- Consistent, unruly disruption in classes
- Grades: C’s and D’s
- Thinking about switching him to program for emotionally disturbed students
- Vision screening + eye exam + glasses
- Almost immediately his disruptive behaviors calmed
- 3 months after vision screening + eye exam + glasses:
  - Grades improved to B’s and working on A’s
  - Student’s aunt told Lions: “You saved my nephew.”

True story from Charles Short – Indiana Lions District 23C – West Lafayette, IN
• 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.

• Children with reading difficulty at end of 1st grade shown to have 88% chance of remaining poor readers end of 4th grade.


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.
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 black optotypes on a white background using specific optotype sizes at a prescribed and standardized distance

2. Instrument-based screening
   - Instruments do not measure visual acuity
   - Instruments analyze images of the eyes to provide information about amblyopia and reduced vision risk factors:
     - Estimates of significant refractive error (hyperopia, myopia, astigmatism)
     - Estimates of anisometropia
     - Estimates of eye misalignment (some, not all)

Threshold & Critical Line Screening

- Threshold screening
  ➢ Move down chart until child cannot correctly identify majority of optotypes

- Critical line screening
  ➢ Use only line child needs to pass according to child’s age
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.

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 Recommendations

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

- **1984 - International Council of Ophthalmology (ICO)**

- **2003 - World Health Organization Prevention of Blindness & Deafness (WHO)**

- **2010 – American National Standards Institute, Inc.**

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

Preferred Optotypes for Ages 3 to 7 Years

- NCCVEH
- AAP
- Recommend LEA SYMBOLS® and HOTV letters as optotypes
Preferred Optotypes for Ages 7 Years & Older

- **AAP**
  - Recommends Sloan Letters
- **American Academy of Ophthalmology**
  - Recommends Sloan Letters and LEA NUMBERS®


NCCVEH - LEA SYMBOLS® for children ages 3, 4, and 5 years at 5 feet

NCCVEH Option - LEA SYMBOLS® for children ages 3, 4, and 5 years at 10 feet
Also acceptable . . .

Options - Kits From AAPOS
(American Association for Pediatric Ophthalmology and Strabismus)

• AAPOS Vision Screening Kit
• AAPOS Vision Screening Kit: Supplemental Screening Package
• 5 or 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

Screening Distance
“Linear-Spaced” and “Wide-Spaced” Want “Proportionally Spaced”

No Single Optotypes or Flashcards Without Surround Bars for Typically Developing Children

- Visual acuity results, on average, 3 lines worse on charts with lines vs. single, non-crowded optotypes
  - For example, 20/32 with single, isolated optotype and 20/80 with line chart


Occluders – Younger Children <10 Years
Unacceptable Occluders Ages 3, 4, and 5 years

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

Why unacceptable?
Children can easily peek


Occluders – Aged 10 Years and Older

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?
    - True

• “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 within 6 months.


World Health Organization (2003) says:
• May be less tedious for children to read 1st optotype on left-side of chart until missing one and then moving up a line and reading entire line

Camparini et al. found: ETDRS-Fast (reading 1 letter per row until a mistake is made) yields accurate results compared with standard method of reading each optotype on every line.
• Also – significantly reduced test time


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 20/20)


Color Vision Deficiency Screening?

- First time enter school – when considering careers
- Why? Don’t want to see Johnny in trouble for not sitting on red dot in circle time because dot looks green or brown.
- Don’t want Jane’s hopes and dreams of becoming an Air Force pilot dashed.

What to Use?

- Book with symbols for young children and numbers for older children
- Tip: If color books >7 years, upgrade; colors desaturate
- Use Q-tip, not fingers; oil from fingers will desaturate colors

Stereoacuity

- PASS 2
- Stereoacuity screening is not a recommendation for ages 3, 4, and 5 years.

Preschool Assessment of Stereopsis with a Smile 2 (PASS 2)
Vision Assessment Corporation

Stereoacuity levels:
480 sec arc for 3 and 4yo; + 240 sec arc for 5yo and older, blank, demo


If mandated to do stereoacuity, NCCVEH recommends PASS 2.
Why Not Random Dot E?

• Failed to make cut for 2nd phase of Vision in Preschoolers study looking at appropriate vision screening tools.

• Elise Ciner, OD, stereoacuity expert with VIP:
  • High untestability rate compared with Stereo Smile (PASS II).
  • Concerns with 50 cm vs. 40 cm (16 in.) screening distance.
  • Unclear whether 550 sec arc stereo level is sensitive enough to detect visual conditions.

Personal Communication 1/19/11 and 2/21/11

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Choices for Near Vision Screening

California using 20/32 line only with both eyes open.

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Instrument-Based Screening

• Use beginning at 12 months; better success at 18 months (AAP)

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

• Instruments at any age for 6 years and older if child or young adult cannot do test of visual acuity (AAP)

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Instrument-Based Screening

- If use instruments, have test of visual acuity as back-up.
- Why? If device has 90% “capture rate”, how screen 10%?

- Do not attempt to convert estimated refractive error to visual acuity value.
- Child could fail vision screening with instrument, but pass with conversion and miss opportunity for eye exam.

Children Who Should Bypass Vision Screening and Go Directly to Eye Exam - NCCVEH

<table>
<thead>
<tr>
<th>Readably observable ocular abnormalities</th>
<th>Neuro-developmental disorders, such as:</th>
<th>Systemic conditions with ocular abnormalities, such as:</th>
<th>Parents or siblings with history of:</th>
<th>History of prematurity</th>
<th>Parents who believe their child has vision problem</th>
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<td>Strabismus</td>
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<td>&lt;32 completed weeks</td>
<td>Message to primary care providers</td>
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<td>Hearing impairment</td>
<td>Multiple Sclerosis</td>
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<td></td>
<td>Don’t wait and see</td>
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<td>Vision impairment</td>
<td>Cognitive impairment</td>
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If Required to Screen All Children . . .

- Use same vision screening tools you use with all children.
- If children are untestable, refer.
- If children pass, explain to parents that the screening result could be inaccurate:
  - Because these children are at a higher risk of having a vision disorder, and
  - Hidden vision problems in children with special needs are common.
- A comprehensive eye exam remains recommended and best practice for these children.

Consensus of the Technical Guidance Subcommittee to the National Center for Children’s Vision and Eye Health – 2.16.17
Subcommittee includes pediatric ophthalmologists and pediatric optometrists.

Referral Letter / Suggested Text for Your Referral Letter

- Link to Referral Letter via NASN:
  http://www.nasn.org/ToolsResources/VisionandEyeHealth

  A comprehensive examination of vision and eye health is recommended for all children. Referral for an Eye Exam is often recommended.

- Link to Referral Letter via NCCVCH (bottom of page):
  http://nationalcenter.preventblindness.org/resources-2

References for previous slide:


Suggested Text for Your Family Information and Referral Letters

- Text to add to your existing referral letters:
  - We refer children for an eye exam when they do not pass vision screening. We also refer children who may pass a vision screening if they are at a higher risk of having a vision disorder because of a medical or developmental reason.

- Include on your referral document:
  - Reason for referral: Increased risk for vision disorder because of developmental or medical reason (describe):

Vision Screening is . . .

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

How to Build a Strong Vision Health System of Care

Evaluating *Your* Vision Health Program

9. We take steps to ensure receipt of eye exam results on all referred children for their file.

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<th>Checklist</th>
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<th>No</th>
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<td>1. We use a reminder system to monitor child files to determine whether we received the eye exam results from the eye care provider.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>2. We use the reminder system to contact the eye care provider if eye exam results are not received within 1 month of the eye exam.</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>3. If eye exam results are not received within 1 month of the eye exam, we have a process to systematically request eye exam results.</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>4. If eye exam results are not received after 3 systematic contacts, we stop the process and indicate on child file that eye exam results could not be obtained.</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>5. If we see a pattern of challenges receiving eye exam results from specific eye care providers, we contact the eye care provider to brainstorm ways to make it easier to receive eye exam results.</td>
<td>Yes</td>
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Notes:

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Year of Children’s Vision

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

National Center for Children’s Vision & Eye Health

- http://nationalcenter.preventblindness.org/

Prevent Blindness Position Statement on School-Aged Vision Screening and Eye Health Programs


NASN Vision and Eye Health Resource

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

https://www.nasn.org/ToolsResources/VisionandEyeHealth

Free eBook:

Navigating the Path of Children’s Vision Screening
• Screening practices
• Recommended tools
• Proper occlusion
• Guidance from national experts

www.schoolhealth.com/media/pdf/NavigatingVisionScreening.pdf

Children’s Vision Screening Training and Certification

http://nationalcenter.preventblindness.org/childrens-vision-screening-training-and-certification
800-331-2020 Nottingham@preventblindness.org