



**Transdisciplinary Play Based Assessment:
Visual Development / Visual Impairment**

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Tanni L. Anthony, Ph.D.

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+ Transdisciplinary Play-Based Assessment (3rd edition)

- By Dr. Toni Linder (2023)
- TD = full team working together in real time
- Play as an expression of the child’s learning and abilities
- Updated to current EC research
- Update of the Visual Development section

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+ The Stakes are High

- Children are at risk for visual challenges.
- Early identification = improved outcomes
- Early brain development tied to meaningful sensory experiences.
- What we do matters.

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+ Role of Vision in Development

- Early sensory organization
- Near and distance / instant and simultaneous information.
- Continually activated during waking hours
- Informs / guides all developmental domains

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+ Visual Development

- Not mature at birth
- Evolving eye / neural pathways
- Vision invites the hand, then the body
- Fine adjustments to visual system the first seven years of life
- Physiological Changes / Cognitive Influence

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+ Typical Visual Development

- Born with visual capacity - vision continues to develop after birth in a maturation process
- Rapid changes the first year of life – adjustments through 7th year.

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+ Developmental Progression

- Reflexive to Voluntary
- Unilateral Image to Stereopsis
- Blur to focus / Field expansion
- Awareness to Discrimination to Recognition

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+ Worldwide Pediatric BVI

- 58% of worldwide childhood blindness is reported to be treatable
- 28% is reported to be preventable

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+ Why Screen a Young Child's Vision?

- Early detection, better options for treatment ... or referral for appropriate early intervention services.
- Potential impact to all developmental domains.
- Greater the visual problem / loss, the greater risk for impact on development.

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+ Overall Prevalence

- 1% to 6% of all children younger than 5 years old have visual challenges.
- Over 174,000 children aged 3 to 5 years in the USA have a condition affecting their vision
- 69% cases are linked to refractive errors / amblyopia
- Projected increase by 26% by year 2060.

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+ BVI Prevalence

- Pediatric blindness/visual impairment = low incidence disability – fewer than 3 percent of the population. 63K learners are legally blind.
- Deaf-blindness even lower incidence. 11,000 identified in USA.

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+ High Risk Populations: Children...

- With a family history of early onset vision problems / impairment
- born prematurely
- Who experienced a traumatic birth
- with craniofacial / head abnormalities
- with an identified syndrome / condition
- with neurological compromise
- exposed to prenatal toxins

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+ High Risk Populations: Children...

- who are Deaf/hard of hearing
- with postnatal infections
- with a history of an accident / trauma to the structure of the eyes / brain

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+ Risk Factors

- Children with any type of disability, such as ASD, deafness, and/or health or orthopedic impairment
- One-half to two-thirds of children with developmental disabilities have BVI

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+ Visual Problems

- A visual condition that interferes with day-to-day visual functioning and has the potential for medical correction.
- With proper medical attention, can be short term in nature.

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+ Visual Problems

- Refractive Error(s)
- Amblyopia
- Strabismus
- Color Deficiency

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+ Refractive Error

Blurred vision that will most often respond fully to corrective, prescriptive lenses such as glasses or contact lenses.

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+ Amblyopia

- A structurally healthy eye that does not see well because its vision is turned off or ignored by the brain due to complications, such as uncorrected refractive error, ocular muscle imbalance, and/or structural defects of the eye

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+ Strabismus

- Misalignment of the eye(s)
- Characterized by laterality, direction, frequency, and magnitude of the eye turn

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+ Color Deficiency

- Most often a hereditary condition
- Affects the ability to distinguish certain shades of color, the brightness of colors, and/or differences between colors.
- Red-green color blindness occurs in 8% of males and 0.4% of females

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+ Vision Problems Plus

- The four vision problems often coexist with diagnoses of visual impairment.
- Three-quarters of learners with permanent visual impairment have concomitant visual processing, eye movement disorders, refractive errors, and/or ocular misalignment

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+ Blindness/Visual Impairment

- Definitions and criteria for visual impairment including blindness vary.
- Legal blindness, low vision
- Permanent vision loss that impacts daily life.
- May be ocular-based or brain-based or both.

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+ Leading Causes in USA

- Brain-based visual impairment
- Optic nerve hypoplasia
- Retinopathy of Prematurity

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+ Vision Screening the Early Years

- No universal newborn vision screening.
- Vision examinations “should” begin in the hospital nursery and continue with well baby checks. Formal vision screening at “least” once between ages 3-6.
- Promising practice: the Neonatal Assessment Visual European Grip (NAVEG)

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+ Vision Screening

- Begins the process of detection of conditions that result in visual problems or impairment,
- may signify serious systemic disease or conditions
- that can be consequential

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+ Mitigation / Treatment

- Many visual concerns can be fully mitigated or minimized (Anthony, 2016a).
- Glasses worn by 2 months and contact lenses may be prescribed within the first year of life (Chen, 2004).
- Corrective lenses are worn by 45% of all identified learners with deaf-blindness (NCDB, 2020)

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Visual Development Observation Worksheet (VDOW)

Updated to five screening areas.

History / Caregiver Concerns – 3

Appearance - 9

Functional Visual Acuity Estimate – 4

Eye Teaming – 3

Red Flag Visual Behaviors - 17

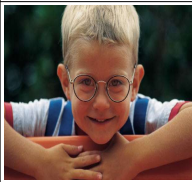
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Visual Development Observation Worksheet (VDOW)

- Further analyzed to ensure each indicator could be gathered from parent input and readily observable within a play-based setting.
- **◆** items = automatic “fail” and need for examination / further evaluation of visual functioning.

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TPBA Vision Screening Components

Family and Child History	Appearance of Eyes and Eyelids	Functional Vision Acuity Estimate
Eye Teaming Skills		Compensatory Visual Behaviors

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+ Family and Child History ◆

1. Are there any biological caregiver history of early-onset vision concerns?
2. Does the child present with any high-risk conditions for vision concerns?

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+ **Family and Child History** ◆

3. Does the family have any visual concerns specific to the child?
4. Has the child been evaluated by an eye care specialist and, if so, what were the findings?

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+ **Appearance of Eyes and Eyelids** ◆

- Suggest general health
- If something does not look right, it deserves further evaluation.
- No diagnosing.

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Appearance of Eyelids and Eyes ◆

Eyelids are unusually red or encrusted	Eyelid(s) is significantly drooping	Eyes are unusually irritated or red.
Eyes tear excessively.	Eyes appear cloudy.	Eyes are different sizes or small.
Pupils / irises are different sizes or shapes.	Eyes are not aligned.	Eyes have shaky, involuntary movements.

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+ **Eye Alignment** ◆

- A component of oculomotor control is to establish eye alignment.
- 3 – 6 months = eyes begin to align.
- If an eye persists in turning *in* after two to three months of age or turning *out* after six months of age, a referral should be made to an eye care specialist.

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+ **Appearance of Eyelids and Eyes**

<p>Pass = the eyelids and eyes appear to be normal.</p> <p>No usual asymmetry, irritation, poor alignment, etc. is noted.</p>	<p>Fail = the eyelids and eyes appear to be asymmetrical, and/or cloudy, and/or not aligned, etc.</p>
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+ **Functional Acuity Estimate**

<p>Near Range Skills</p> <ul style="list-style-type: none"> ■ Eye contact ◆ ■ Pellet / small object from 10-12 inches ◆ 	<p>Far Range Skills</p> <ul style="list-style-type: none"> ■ 6-8 inch object from five or more feet ◆ ■ Silent face from seven or more feet. ◆
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+ Power of the Human Face

- Most appropriate stimulus to promote visual-development.
- Within hours, the newborn will show preference for the mother's face over that of a stranger's. Initially drawn to contrast hair / hairline.
- 6 – 8 weeks of age = eye contact with other people and begin to smile back to a smiling face.

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+ Visual Acuity

- The visual acuity of a newborn has been found to be 10-30 times poorer than that of an adult.
- By the end of the first year = moves from 20/600 to 20/40 (using PL cards) – (resolution vs. recognition)

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+ Early Functional Near VA Examples

- 6-7 months = notices items as small as food crumbs 
- 8 months = fixate on a 1.25 mm (a cake decoration candy from a distance of 10 or more inches. 

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+ Early Functional Distance VA Examples

- 6 months = extend focus up to at least five feet away
- 18 months = children can fixate on a 2.5-millimeter ball located 20 feet away

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+ Functional Vision Acuity Estimate

Pass = Eye contacted reciprocated.
Pass = Notices 1–3-inch object.
Pass = Notices cereal piece or other very small item.

Fail = Does not reciprocate eye contact.
Fail = Does not pay attention to small objects.
Fail = Does not pay attention to very small item(s).

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Eye Teaming Skills ♦

Fixation	Tracking
Maintains fixation for two seconds / both eyes	Follows object horizontally / both eyes in unison
	Follows object vertically / both eyes in unison

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+ Oculomotor Skills

- Eye movement skills are present at birth and continue to refine over the course of the next several months.
- Nine minutes from birth, infants turn their heads and eyes to follow (track) a two-dimensional schematic face pattern.
- At this point in time, the eyes do not have independent movement from the head.

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+ Eye Teaming Pass

Pass = Maintains fixation on target with both eyes for at least two seconds

Pass = Tracks object moving vertically from above head to below chin

Pass = Tracks object moving horizontally from side-to-side

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+ Eye Teaming Fail


Fail = Does not maintain fixation on target with both eyes for at least two seconds.

Fail = Does not track object's vertical movements / eyes do not follow in unison / jerky movements

Fail = Does not track object's horizontal movements / eyes do not follow in unison / jerky movements

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Red Flag Visual Behaviors ♦



This part of the protocol should be completed toward the end of the assessment – after the child has been observed for enough time to know if there is a pattern to “looking” behavior.

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- Squints eye when looking
- Closes or covers one eye when looking
- Closes eyes / turns face away when listening to others
- Squints / tears excessively to bright light
- Blinks more than usual
- Frequently rubs, presses, or pokes eyes
- Turns / tilts head when looking
- Exhibits unique eye positions
- Very close viewing of objects
- Looks mostly at objects in isolation

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- Notices visual targets only when in motion
- Increased visual engagement to items only of a specific color(s)
- Inaccurate reach / looks away when reaching
- Sudden decrease of movement with illumination changes.
- Stumbles often over objects / frequent collisions
- Has difficulty detecting ground surface changes
- Has inconsistent visual behaviors / performance

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+ Red Flag Behaviors

Pass = No Red Flag Behaviors Observed or Reported.

Fail = Any Red Flag Behavior Checked

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Giving Results to Parents



- Caution that results are tentative.
- Do not diagnosis
- Review concerns
- Make recommendations for next step follow-up.

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- **+ Caution if child fails the vision screening during the TPBA – all other results are suspect until more information can be gathered.**
- If the team knows ahead of time that the child has blindness/visual impairment, it will be important for them to prepare for needed accommodations for full access to the assessment activities

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+ Child with BVI or DB

- Goal is accessibility.
- This includes setting, presentation, timing, and response.
- Best determined by the TVI / O&M Specialist.
- Plan ahead!

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+ Child’s Communication System(s)

- Receptive Communication Tips
- Expressive Communication Tips

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+ Customized Tactile Supports

- Use of Real Objects
- Touch Cues
- Tactile Symbols
- Hand Under Hand

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+ Customized Visual Presentations / Displays

- Angle / Positioning
- Size / Distance
- Color / Contrast
- Reflection / Shine / Illumination
- Complexity / Foreground-Background
- Familiarity / Novelty
- Room / Task Lighting

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+ Auditory Distraction Free Environment

- As much as possible, the assessment environment should be a quiet place for the child to attend, listen, think, and do.
- Understand the dual function of “stilling.”

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+ Customized Pacing

- Time for Presentation, Processing, and Response
- Quiet Time for Processing
- Attention to Pacing with Familiar Versus Unfamiliar

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+ Postural Supports

- If needed, provide adaptive seating / standing materials or equipment to assist the child in maintaining the focus on play when the focus is not on assessment balance/gait.
- This may include adaptive mobility devices for posture support in addition to O&M skills.

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+ Defined working or Play Spaces

- Provide appropriate boundaries/ trays for play areas for easier retrieval of items within the space or dropped items.

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+ Balance Sensory Demands

- The child works hard to take in, process, and respond to organization, and reaction time into play scenarios.
- Sensory challenges, such as absent or low vestibular function or poor proprioception abilities, will require extra attention.

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+ Balance Sensory Demands

- The effects of combined “visual and auditory noise” will likely be overwhelming / fatiguing.
- Care should be taken to introduce or reintroduce “calm”

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+ Salient Verbal / Sign Description

- Pair with hands-on, concrete experiences with real objects, and ample opportunities for meaningful exploration to make sense of a world of sounds, voices, and blurred or absent visual images.
- Do not inundate the child with a steady stream of auditory information, but to allow time for the time to listen to meaningful descriptive language, understand, and respond

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+ Salient Verbal / Sign Description

- If the child is deaf-blind, care will need to be taken to use the expressive and receptive communication system of the child within consideration of visual acuity, field, and processing needs.

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+ Appropriate Room Orientation Supports

- Assist with the understanding of layout and contents of the assessment environment.
- May give the child a verbal and physical tour of the setting ahead of the assessment activities.
- As the child explores, give salient information about the surroundings.
- Consult guidance of an O&M Specialist.

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+ Appropriate Mobility Supports

- Be aware of mobility tools to assist the child in safely and efficiently navigating the assessment environment. This may include the use of an adapted mobility device or a long cane.
- Such tools will require the guidance of an Orientation and Mobility Specialist.

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+ Specialized Materials / Equipment

- Address needs such as the use of a magnifier or braille books during literacy activities or adding simple tactile cues or graphics to a page with visual images.
- Items may include braille books, braille writer, reading standing, high contrast aprons/capes / towels, lightbox, etc.

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+ Age-Appropriate Expectations

- As a rule, what is expected of a child with sight should be the same expectations for a child who is blind/visually impaired.
- Guard against being over-protective of the child and maintain high expectations for the child's involvement and participation in activities that are common for other children the same age.

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