

Abby's parents requested this evaluation to see if Abby's difficulty with bicycle riding was due to balance difficulties. The color-coded summary presents Abby's strengths and weaknesses.

This Abby doesn't have balance problems, but she gets tired quickly while riding a bicycle or sitting at her desk due to weak trunk muscles (especially her back muscles that maintain her upright posture). Abby seems sensitive to movement, as she didn't like quick movements as a baby and preferred sitting still. She didn't crawl, which can lead to weaker upper body and arm muscles in kids who are sensitive to movement.

Abby presents with several unintegrated reflexes. For example, the ATNR reflex has Abby move her opposite arm when she turns her head. Naturally, this makes riding a bicycle difficult. It also likely affects Abby when she turns her head in class and her writing hand moves off the page.

Abby also shows signs of the MORO reflex, which can affect impulse control and tongue control, both of which seem to be challenging for her. Another concern is that Abby doesn't have a clear preference for using her left or right hand. It's likely she's left-handed but was encouraged to use her right hand by a teacher who didn't realize her natural inclination.

In terms of sensory processing, Abby struggles most with understanding verbal instructions. To help her, it's recommended that her teacher speaks to her left ear (her dominant ear) to improve her receptiveness to verbal instructions. Abby can remember sequences of up to five steps, but she struggles with processing steps out of sequence, so it's best to keep instructions limited to two steps for new lessons or information.

Lastly, Abby has difficulty with visual tracking, which could lead to problems when reading, writing, or copying from the board. To assist her, she should be seated closer to the board, and her books should be placed in the middle of her desk to help her stay on track.

Screening Report

BALANCE

Normal	(1) Static Balance - Simple
Normal	(2) Static Balance - Complex
Normal	(3) Dynamic Balance - Simple
Normal	(4) Dynamic Balance - Complex

GROSS MOTOR

Mild difficulty	(5) Flexors
Area Difficulty	(6) Extensors
Mild difficulty	(7) Muscle Tone
Normal	(8) Coordination

VISUAL SYSTEM

Normal	(9) Figure ground
Mild difficulty	(10) Shifting gaze (no head movement)
Normal	(11) Fixation
Normal	(12) Fixation/head movement
Normal	(13) Convergence
Normal	(14) Divergence
Area Difficulty	(15) Tracking H pattern
Area Difficulty	(16) Tracking O pattern

SIDEDNESS

Dominance	
right	EYE
left	EAR
right	HAND
left	FOOT

COGNITIVE/MEMORY

(23) Sequencing (ordered)	5 step
(24) Processing (non-ordered)	2 step

REFLEXES

Normal	(17) TLR
Area Difficulty	(18) ATNR
Normal	(19) SPINAL GALANT
Normal	(20) STNR
Normal	(21) Palmar Reflex
Mild difficulty	(22) MORO

BODY AWARENESS AND SENSORY

Area Difficulty	(25) Verbal praxis (Following verbal directions)
Normal	(26) Visual sequencing (Visually copying movements)
Normal	(27) Postural Praxis (Visually copying static position)
Mild difficulty	(28) Copying tongue movements (oral praxis)
Normal	(29) Body awareness in space (kinesthetic praxis)
Normal	(30) Grading movement (erratic vs smooth)
Normal	(31) Crossing midline
Normal	(32) Tactile awareness (touch)
Mild difficulty	(33) Vestibular (movement registration) = hyper-sensitive

Legend

Area Difficulty
 Mild difficulty
 Normal

Glossary of Terms

Reduced balance may affect an individual's ability to stand, walk or may find sports difficult to perform.

(1) Static Balance – Simple: Can the individual stand with one leg off the ground without losing balance. This skill is necessary to perform activities like stepping over/onto the bicycle.

(2) Static Balance – Complex: a more direct means to test static balance without the help of vision (eyes closed)

(3) Dynamic Balance – Simple: Balance while moving (e.g., heel to toe walking). This skill is needed for activities like pedaling, starting to ride from standstill.

(4) Dynamic Balance – Complex: a means to test dynamic balance without the help of vision (eyes closed)

After an individual develops sensory processing skills, they progress on to developing Gross Motor skills (large muscle movement) and fine motor skills (small muscle movement):

(5) Flexors/Extensors (6): trunk muscles of the back and chest. Individuals with weak trunk strength may present as distractible/fidgety, poor seated endurance, may have sloppy handwriting due to poor posture, or even appear clumsy. This is because just keeping themselves upright for a prolonged period is difficult. On a bicycle, these individuals may present with poor posture or become fatigued very quickly.

(7) Muscle Tone: a person's ability to tighten and hold their muscles for a prolonged period. Muscle Tone goes beyond simple strength. An individual with low tone may present as being "floppy", have difficulty grasp/hold on to handlebars of a bicycle, maintain posture or pedaling. Individuals with low tone may present with poor penmanship because holding a pencil is fatiguing or hard to control small movements needed for good penmanship.

(8) Coordination: the ability to coordinate different parts of the body. A bicycle rider with poor coordination may not be able to coordinate their legs to pedal, turn the steering wheel and plan where to travel.

Vision is more than just the ability to read text from a distance (i.e., 20/20 acuity). A bicycle rider needs to visually attend to their surroundings.

(9) Figure Ground: the ability to visually see one item in a field of multiple objects

(10) Shifting gaze: the ability to look from one object to another (e.g., reading from left to right).

(11-12) Fixation: the ability to keep looking at an object (with or independent of head movement).

(13) Convergence: the simultaneous inward movement of both eyes to work together to look at nearby objects (i.e., have trouble reading/writing, double vision, become tired or have trouble focusing on objects such as cars move toward the rider).

(14) Divergence: simultaneous outward movement of both eyes away from each other to look at far away objects (i.e., have trouble reading/writing, double vision, become tired or have trouble concentrating).

(15-16) Tracking (H O): the ability of both eyes to follow vertical, horizontal and circular movements to visually track an object.

Retained reflexes typically disappear/integrate by the first year of life. If, however, these reflexes are retained, they may affect multiple areas of daily function. These reflexes are most prominent when an individual is presented with a new or difficult task (e.g., learning to ride a bike).

(17) Tonic Labyrinthine Reflex (TLR): As the rider extends or flexes their body, they exhibit significant tone that makes riding more difficult. They will also frequently exhibit difficulty with balance, muscle tone, poor posture, tendency to walk forward on toes, weak at ball skills, and poor articulation.

(18) Asymmetrical Tonic Neck Reflex (ATNR): As the rider turns their head to one side, the arm on the side being turned away from extends like a punch, while the other arm retracts back. This means that every time the rider turns their head, the bicycle may violently turn to the side being looked toward. In addition, ATNR is often related to difficulties with handwriting (eg, difficulty writing on the non-dominant side of the page), bilateral integration, eye-hand coordination, lateral eye movement, reading and laterality (do not have a dominant side of the body).

(19) Spinal Galant: A movement response when the back is touched. Individuals with non-integrated/retained spinal galant may exhibit bedwetting, difficulty concentrating, short-term memory issues, or fidgeting.

(20) Symmetrical Tonic Neck Reflex (STNR): Riders who exhibit this reflex may move both arms/body when looking up/down. STNR may affect the individual's ability to read without losing the words at the middle of the line and to visually follow the moving hand when writing. Other symptoms include poor posture, tendency to slump when sitting, particularly at a desk, poor hand-eye coordination, messy eating, clumsy, problem catching balls and slow at copying from blackboard.

(21) Palmar Grasp Reflex: The rider's fingers will flex when the palm is touched gently. People who exhibit palmar grasp reflex may exhibit poor fine motor skills, stick out tongue when concentrating or speech problems, poor handwriting and reversing letters when writing.

(22) Moro: known as the startle reflex, if a individual retains this reflex, he may become over sensitive and over reactive to sensory stimulus resulting in poor impulse control, sensory overload, anxiety and emotions and social immaturity. Some additional signs of a retained Moro reflex are motion sickness, poor balance, poor coordination, easily distracted, unable to adapt well to change, and mood swings.

A bicycle rider needs to not only remember but also needs to make decisions that makes bicycle riding safe:

(23) Sequencing: arranging and recalling information in a particular order. Important for things like road rules.

(24) Processing: recalling information stored in memory in an order different from the order it was memorized in. This is key for making safe decisions when in a new situation.

A rider needs to respond to sensory stimuli to safely ride a bicycle. Riders need to process sensory information (e.g., vision, touch, etc):

(25) Verbal Praxis: The ability to listen and follow a verbal directions (e.g., hearing and executing a teacher's oral instructions). This is key in a new rider's ability to follow direction from an instructor.

(26) Visual Sequencing: The ability to observe and follow visual directions (e.g., copying the instructor's movements when learning to ride or copying multiple items from a board).

(27) Postural Praxis: The ability to copy body posture (e.g., positioning one's body to sit and propel the bike).

(28) Copying tongue movements/Oral Praxis: The ability to plan and execute tongue movements (e.g., speaking, swallowing, as well as a good indicator of ability to coordinate body movements).

(29) Body awareness in space (kinesthetic praxis): the ability to move one's body without help of vision (e.g., knowing where the pedal is located in relation to the foot).

(30) Grading Movement: the ability to use the appropriate amount of force to complete motor skills (e.g., too little/much pressure when pedaling).

(31) Crossing Midline: The ability to move body from one side to the other (e.g., visually track from left to right or reach toward the left using the right hand). This is a key skill needed to integrate left/right side of the body to pedal and steer a bicycle.

(32) Tactile Awareness: The ability to identify 1–2-point touch without vision (e.g., to comb hair, buttoning or find items in a backpack without vision). Riders who have difficulty in this area may squeeze too hard on the handlebars or not interpret feedback from the bicycle appropriately.

(33) Vestibular: This test gives us information about how an individual can orient themselves upright against gravity, their ability to stay alert, and how they combine sensory information to understand where they are in space. The balance center is located within the inner ear. It not only controls balance but can affect the rider's body tone. An overstimulated vestibular system may present with fear of subtle bicycle movement. Riders who's vestibular system is understimulated may not get the balance feedback they need to ride upright.