

Non-traumatic Brain Injury in Children: Signs/Symptoms and the Potential Impact on Learning in the Classroom

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Introduction Statements:

- Why did I choose this topic – because traumatic brain injuries (concussion, falls, impact injuries to the head, neck or shoulders) get the lion share of attention in children.
- What about the “nontraumatic” brain events in a child’s life that are less obvious or under-reported, but are just as significant to a child’s development and their ability to access learning in a classroom.
- According to the NH Child Count Data for 2018 there were 29,000+ students in NH with an IEP and only 78 of them were identified eligible for special education services under the TBI eligibility form
- These numbers certainly don’t gel with the number of students being seen for suspected TBI/Concussion in our emergency rooms every year
- As a 37-years medical SLP who transitioned to public school work 6.5 years ago, I quickly came to realize that our educational colleagues have minimal exposure or knowledge of brain injuries that do not fall under the classification of concussion.
- It is important to recognize the difference between a TBI and a non-traumatic brain injury, which both fall under the umbrella term "acquired brain injury."
- **A traumatic brain injury (TBI) is defined as "a disruption in the normal function of the brain that can be caused by a bump, blow, or jolt to the head, or penetrating head injury**
- **A non-traumatic brain injury is damage to the brain caused by a disruption of internal factors, for example, lack of oxygen, exposure to toxins, an infectious disease, or the presence of a tumor**
- A congenital brain injury (versus acquired) is an injury to the brain that is hereditary, congenital, degenerative, or induced by birth trauma

Traumatic Brain Injury	Non-traumatic Brain Injury	Congenital Brain Injury
Concussion	Childhood trauma	Stroke in utero
Falls	Near drowning (anoxia)	Cerebral Palsy
Motor Vehicle Accident	Strangulation (anoxia)	Prenatal exposure to drugs and/or alcohol
Trampoline Injury	Lead exposure after birth	Genetic syndromes
Gunshot wound	Long Covid	Maternal lead exposure
Injury due to domestic violence	Brain Tumor	Birth trauma

A lesser acknowledged high-risk group of children > those who are currently or previously within a Child Welfare System.

Prenatal Risk Factors:

- Increased exposure to drugs and/or alcohol
- Poor maternal nutrition during pregnancy
- Domestic violence to the mother during pregnancy that may impact fetal development (strangulation)

Postnatal Risk Factors:

- Birth trauma
- Poor environmental conditions in the home
- Food insecurity/poor nutrition
- Lead exposure
- Domestic violence
- Poor or inconsistent medical care
- Abuse/neglect
- Emotional trauma

A perfect start to our educational discussion today is to share with you an illustrative case history on how an undisclosed/unknown TBI (traumatic or non-traumatic) can impact a student's academic experience.

Why are more children not deemed eligible for special education services with a classification of TBI?

- A student can only meet the eligibility criteria for TBI if their situation involved some form of external force (concussion, gun-shot, fall, MVA)
- "Non-traumatic" brain injuries are excluded (anoxia, near drowning, Long Covid)
- The team of professionals making the eligibility determination may not have enough experience with TBI to comfortably pursue this eligibility
- The special education team may not have a thorough medical and developmental history for the student and therefore is not aware of a history of TBI
- Unlike the medical model which encourages therapists to seek out a thorough medical history for their patients, this is not expected/sanctioned practice in the educational model
- Some parents may be uncomfortable with the label "TBI" being affixed to their child and therefore, do not disclose its occurrence

Potential Consequences of Incomplete Special Education Eligibility Decisions:

- Students with unknown histories of TBI are often found eligible for special education services under the classification of Specific Learning Disability or Other Health Impairment (ADHD)

- This occurs because the scores for one or more of the cognitive processes that are evaluated by the School Psychologist (not the SLP) fall into the below average or low performance category while others may fall into the average category
- SLD eligibility looks for a pattern of both academic strengths and weaknesses
- The two most common cognitive processes where below average performances are seen are Speed of Processing and Working Memory (sound familiar?) with a scatter of abilities within the academic testing domains (reading, spelling, writing, math, phonological processing)
- An incorrect identification of eligibility may impact what support services, accommodations and modifications that are included in the student's IEP
- An incorrect identification of eligibility may also impact the team's expectation of whether or not they are dealing with a permanent or transient disability (some degree of recovery can be expected with an acquired TBI; less so with a congenital TBI). A Learning Disability similar to a **significant** Brain Injury is life- long in that it responds best to strategy interventions versus recovery interventions.

TBI versus Specific Learning Disability versus Other Health Impairment (ADHD) versus Intellectual Disability versus Emotional Disorder etc. How Can We Be Sure????

- The short answer is we can't – unless we have documentation showing a history of TBI.
- Many of the resulting sequelae from TBI closely resemble characteristics of Attention-Deficit Disorder and Specific Learning Disability.
- This is especially challenging if the TBI occurred prior to the student's enrollment in our school and relies heavily on parental disclosure
- However, there is an opportunity to recognize the signs and symptoms of an unreported TBI if the student is known to us and we have a baseline for their typical behaviors at school and their typical academic performance. What changes might we see?

Signs and Symptoms That May Be Indicative of a More Recent Unknown TBI:

- An atypical prolonged absence from school (greater than 2 or 3 days)
- Sudden, rapid and unexplained changes in behavior at school
- Behaviors associated with ADD, SLD, ID and ED are typically visualized early on in the student's career and are exacerbated as academic demands increase
- Sudden, rapid and unexplained changes in academic performance (tolerance, attention, declining grades, new never before seen difficulties with executive functions)
- ADD, SLD, ID and ED are typically seen early in the student's career – these are the result of atypical neurological landscapes that are permanent in nature – a student does not typically outgrow them. Executive function development is delayed from the start of the student's academic experience, not suddenly. Delayed executive function development can be seen as early as pre-school.
- Increased somatic complaints: headaches, light sensitivity, drowsiness, dizziness, noise sensitivity
- Changes in motor functions: clumsy, unbalanced, increased falls on playground
- Changes in behavior: increased distractibility, reduced sustained or focused attention, irritability, newly impulsive, aggression, disruptive, decline in working memory and yes, changes to processing speed and response times

- Changes in communication patterns: tangential speech, changes in auditory comprehension, word finding problems, dysfluency
- Emotional lability
- Changes in peer interactions and social behaviors

Red Flags for an Undisclosed/Unknown TBI (acquired or congenital) in Early Childhood (Prior to Starting School)

- One of the most likely scenarios is pre-natal exposure to drugs and/or alcohol which is highly under-reported
- In truth, the parents may not even know an injury had occurred e.g. an unwitnessed fall or injury while playing with friends
- Given our bare minimum access to a student's medical history, look for learning patterns in the student's siblings
- What is the student's history of participation in team sports
- Are there any visible scars on the forehead, eyebrows, chin, nose, cheeks that would indicate a possible "forceful" injury – a TBI can occur with a direct impact to the face instead of the head (in some cases a forceful impact to the shoulders or upper back can also result in a TBI)
- When the School Psychologist administers the WISC-V, pay attention to the Working Memory and Speed of Processing Standard Scores – these scores often correlate with some form of neurological sequelae.
- Students with a history of possible TBI (traumatic and non-traumatic) strongly resemble students with ADHD including hyperactivity, impulsivity, impaired sustained and focused attention, weak auditory learning, stronger visual learning, poor executive functions, delayed processing, delayed response times, poor working memory, low language, restlessness, emotional dysregulation and difficulty with transitions.

Domains of Assessment for a Suspected Brain Injury:

- Orientation
- Attention
- Memory
- Executive functions
- Visuospatial skills for reading and writing
- Problem solving
- Processing speed
- Deficit awareness
- Initiation/motivation
- Comprehension and verbal language
- Social communication and social pragmatics

Formal Speech Pathology Assessment Measures:

- Pediatric Test of Brain Injury

- Behavioral Rating Index of Executive Functions (BRIEF)
- Student Functional Assessment of Verbal Reasoning and Executive Function (FAVRES)
- Test of Everyday Attention
- Standardized Touchscreen Assessment of Cognition (STAC or F-STAC)
- Comprehensive Assessment of Spoken Language (CASL)
- Clinical Evaluation of Language Fundamentals-5 (CELF-5)
- Oral and Written Language Scales (OWLS): Listening Comprehension and Oral Expression
- Test of Auditory Processing Skills (TAPS)
- Test of Pragmatic Language (TOPL)
- Clinical Assessment of Pragmatics (CAPs) – video-based assessment

Informal Assessment Measures:

- Parent or caregiver interview
- Analysis of conversational discourse (language sampling)
- Social communication and social cognition rating scales
- Academic needs assessment – given to and completed by the classroom teacher
- Classroom observation

- **Behavioral observations noted during speech and language testing**
 - Auditory processing delays or challenges
 - Requires frequent repetition of task directives or questions
 - Delayed verbal response times
 - Distracted by environmental stimuli
 - Internal distractions e.g. tangential changes in topic, comments or questions
 - Obvious difficulty with auditory working memory
 - Word finding/retrieval problems
 - Difficulty with multi-step directives
 - Does better on assessment tasks that contain visual supports (pictures) that anchor them to a task
 - Cannot complete testing in one session; requires additional time to complete required tasks

Questions and Answers

Thank you for joining today's presentation

