**TBI-BH ECHO**

Traumatic Brain Injury – Behavioral Health ECHO

UW Medicine | Psychiatry and Behavioral Sciences

# TBI-BH ECHO 2026

## A Tale of Chickens & Eggs: TBI, LD, & ADHD

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# Objectives

1. At the end of this talk participants will be able to describe ADHD/LD as a risk factor for developing a TBI
2. At the end of this talk participants will be able to list the symptom overlap between ADHD/LD and TBI
3. At the end of this talk participants will be able to describe ADHD/LD and TBI

# Speaker Disclosures

## No conflicts of interest

- The following series planners have no conflicts of interest:
  - Jennifer Erickson, DO
  - Jess Fann, MD
  - Cherry Junn, MD
  - Chuck Bombardier, PhD
  - Cara Towle, MSN, RN, MA

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# Addition disclaimers

I am an ADULT psychiatrist (with addition credentials)

- I am not a child psychiatrist
- I am not a sports medicine provider
- We will be walking through the literature…

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# Road map of questions

1. Does ADHD & SLD increase risk of a TBI or concussion?
2. Does ADHD & SLD impact how we screen for TBI?
3. Does a ADHD & SLD change the symptoms or recovery from a TBI?
4. Does having a TBI increase diagnoses of ADHD or SLD?

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# The literature…

We cannot pick what is available

- Most of the populations mentioned are athletes
- Almost all populations are children or adolescents
- Much of it is in sports medicine so … concussions
- Specific learning disability is broad and underreported
- Long term impact?

# Does ADHD & SLD increase risk of a TBI or concussion?

- Diagnoses of ADHD, SLD, and TBI
- Rates of presentations
- Risk of TBI or concussion

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# ADHD

Who & how?

- An estimated 7 million (11.4%) U.S. children aged 3–17 years have ever been diagnosed with ADHD (CDC, 2022)
- Co-occurs with behavioral problems, learning disorders, anxiety, depression, autism

# ADHD

## DSM 5 TR Definition

- Children usually need to exhibit at least 6 symptoms
- Adults (17 and older), the threshold is 5 symptoms.
- These must have been present for at least 6 months and interfere with daily functioning
- Symptoms need to be present before age 12

# ADHD

| Category | Specific Symptoms |
| --- | --- |
| **Inattention** | * Fails to give close attention to details; makes careless mistakes<br>* Has difficulty sustaining attention in tasks or play<br>* Does not seem to listen when spoken to directly<br>* Fails to follow through on instructions or finish work<br>* Has difficulty organizing tasks and activities<br>* Avoids or dislikes tasks requiring sustained mental effort<br>* Loses things necessary for tasks (e.g., keys, wallet, phone)<br>* Is easily distracted by extraneous stimuli<br>* Is forgetful in daily activities |

# ADHD

| Category | Specific Symptoms |
| --- | --- |
| **Hyperactivity & Impulsivity** | * Fidgets with or taps hands/feet; squirms in seat<br>* Leaves seat in situations when remaining seated is expected<br>* Runs or climbs in inappropriate situations (restlessness in adults)<br>* Unable to play or engage in leisure activities quietly<br>* Often "on the go," acting as if "driven by a motor."<br>* Talks excessively<br>* Blurts out answers before a question has been completed<br>* Has difficulty waiting their turn<br>* Interrupts or intrudes on others (e.g., butts into conversations) |

# ADHD

## DSM continued

- Combined Presentation: Enough symptoms of both inattention and hyperactivity-impulsivity are present
- Predominantly Inattentive Presentation: Enough symptoms of inattention are present, but not hyperactivity-impulsivity
- Predominantly Hyperactive-Impulsive Presentation: Enough symptoms of hyperactivity-impulsivity are present, but not inattention

# Specific Learning disability (Dyslexia & …)

Who?

- About 10–15% of the population (Snowing et al, 2020)
- Roughly **1 in 5 students** has some type of language-based learning difference
- Dyslexia accounts for ~80% of learning disabilities identified in schools

# Specific Learning disability (Dyslexia & …)

| Criterion | Requirement | Key Details |
|---|---|---|
| **A. Symptoms** | Persistent difficulty in at least one academic area for **at least 6 months**. | Includes: Slow/effortful reading, difficulty understanding meaning, spelling struggles, or written expression issues. |
| **B. Severity** | Academic skills are **substantially below** what is expected for their age. | Performance must be significantly lower than peers, causing interference in school, work, or daily life. |
| **C. Onset** | Difficulties begin during **school-age years**. | Note: Challenges might not fully manifest until demands increase (e.g., timed tests or heavy reading loads in later grades). |
| **D. Exclusions** | Not better explained by other factors. | Must rule out: Intellectual disability, uncorrected vision/hearing, other mental/neurological disorders, or lack of instruction. |

# Specific Learning disability (Dyslexia & …)

| Feature | Old Perspective (Pre-2025) | New Perspective (IDA 2025/2026) |
|---|---|---|
| **The "IQ Gap"** | Focused on "unexpected" failure relative to IQ. | **Removed.** Dyslexia is recognized regardless of IQ score. |
| **Instruction** | Less emphasis on teaching quality. | **Core focus.** Difficulties must persist even after high-quality instruction. |
| **Scope** | Mainly focused on decoding (sounding out). | **Expanded.** Includes reading speed (fluency) and spelling as core markers. |
| **Complexity** | Seen primarily as a "sound-processing" issue. | **Multifactorial.** Recognizes genetic, neurobiological, and environmental factors. |
| **Well-being** | Secondary emotional issues were often ignored. | **Integrated.** Explicitly lists impact on mental health and employment. |

# TBI

Reminders & check out saved talks…

- **~2.87 million** TBI-related ED visits, hospitalizations, and deaths annually (CDC, 2024)
- Mild TBI is most common
- Symptoms often persist beyond injury

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# TBI

| Category | Primary Symptoms | Impact & Characteristics |
|---|---|---|
| **Attention & Processing** | Slowed thinking, mental fatigue, reduced processing speed, difficulty multitasking, attention deficits. | Tasks take longer to complete; high mental effort leads to "brain drain"; can appear similar to ADHD. |
| **Memory** | New learning difficulties, poor recall, forgetting conversations, asking repeated questions. | Difficulty "encoding" new information; short-term memory is often more affected than long-term memory. |
| **Language** | Word-finding difficulty (tip-of-the-tongue), reduced verbal fluency. | Reading comprehension may drop specifically due to fatigue |
| **Executive Function** | Planning and organization problems, reduced cognitive flexibility. | Difficulty "shifting gears" between tasks or mapping out complex schedules. |
| **Emotional / Behavioral** | Irritability, depression, anxiety, emotional lability. | Mood swings (lability) can be sudden; emotional regulation often requires more effort than before the injury. |

# TBI, ADHD, & SLD

| Feature | Dyslexia / ADHD | TBI (cognitive) |
|---|---|---|
| Onset | Lifelong | After an injury |
| Course | Stable | Often fluctuates or improves |
| Pattern | Consistent | Often uneven or global |
| Fatigue sensitivity | Mild | Marked |
| Processing speed | Mildly affected | Often slowed* (Finley et al, 2021) |
| Headaches | No | Common |
| Emotional changes | Secondary | Often primary |
| Sleep disturbance | Sometimes | Common |

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# Does ADHD & SLD increase risk of a TBI or concussion?

- ADHD maybe prevalent among athletes (Stewman et al, 2018)
- As high as 8% in systematic review (Poysophon and Rao, 2018)
- ADHD may increase risk 2-3 x. SLD is less clear *

# Does ADHD & SLD impact how we screen for TBI?

- May need to expand screeners for oral reading. Rapid Automatized Naming tasks (Wiseheart, 2017).
- Self reports have low sensitivity for SLD (Wiseheart, 2019)
- If using ImPACT, higher risk of invalid baseline performance scores (Maietta, et al, 2023)
- Parent & child reporting 70.7 -94.9% agreement on hx (Moran et al, 2024)

# Does ADHD & SLD impact how we screen for TBI?

- Maietta et al, 2021
- 33,772 athletes age 13-19 screened with ImPACT
- Comparison by Group:
  - ADHD: 9.7% invalid.
  - Learning Disabilities (LD): 15.1% invalid.
  - ADHD/LD Comorbidity: 16.2% invalid.
  - Special Education (SpED): 13.2% invalid.

# Does a ADHD & SLD change the symptoms or recovery from a TBI?

- Prolong symptoms, Increase symptoms, similar recovery trajectory (Martin, 2022)
- ADHD 2/2 TBI may need addition  academic support (Narad et al, 2022)
- ADHD + TBI - May have worsen sleep, Dizziness, and concentration in 1st 72 hours (Cooke et al, 2023)

# Does having a TBI increase diagnoses of ADHD or SLD?

- Narad et al, 2018
- 187 children aged 3-7, comparing TBI (81) and orthopedic injury (OI) groups (106)
- Long-Term Risk: Children who sustain a severe TBI are at a significantly higher risk of developing S-ADHD up to 7 to 10 years after the initial injury. (HR: 3.62)

# Does having a TBI increase diagnoses of ADHD or SLD?

- Brown et al (2022) - Birth cohort 1976 -1982
- TBI Incidence: The incidence rate of TBI before age 10 was 1,156 per 100,000 person-years.
- Risk Factors:
  - Children with TBI were more likely to develop ADHD (HR, 1.68) and LD (HR, 1.29) by age 19
  - Significant associations were particularly noted in cases of possible TBI (ADHD: HR, 2.05; LD: HR, 1.42)

# What are reasonable steps for assessment & treatment?

- Early Identification & support for parents (Narad et al 2022)
- Case report reading intervention working for dyslexia (Hux, 2019)
- Roitsch et al, 2018 Systematic Reviewed Behavioral Treatments
  - Attention training - limited effects
  - Strategy training - minot effects

# Pharmacotherapy - Challenges

| Aspect | Clinical Consideration | Reference |
|---|---|---|
| **Symptom Masking** | May hide cognitive fatigue or "brain fog." | **Stewman et al. (2018)** |
| **Test Consistency** | Medicated state must match between baseline and post-injury. | **Maietta et al. (2023)** |
| **S-ADHD Treatment** | Higher risk of side effects in post-TBI brains. | **Narad et al. (2022)** |
| **Evidence Quality** | Quality of systematic reviews for behavioral/medication treatment is low-moderate. | **Roitsch et al. (2019)** |

# Pharmacotherapy - Meds & TBI

| Feature | Methylphenidate (Stimulant) | Amantadine (Dopamine Agonist) |
|---|---|---|
| **Primary Indication** | Cognitive fatigue, depression, S-ADHD. | Functional recovery acceleration, post-traumatic headaches. |
| **Key Cognitive Benefit** | Processing speed (Trail Making Test). | Verbal memory, global cognitive status (MMSE). |
| **Pediatric Use** | Some evidence for SADHD & responsiveness. | Some evidence for recovery pace in severe TBI. |
| **Adult Use** | Chronic fatigue and "brain fog." | Acute-phase arousal and chronic headaches. |
| **Major Side Effect** | Increased heart rate, insomnia. | Gastrointestinal issues (mild), agitation (rare). |

# Summary of TBI+ ADHD/LD

- Pre-TBI baseline complexity
- Acute Post-Injury Vulnerability
- Recovery Obstacles
- Long-term Impacts

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# Take home points:

| Clinical Concern | Neuropsychiatric Implication | Recommendation |
|---|---|---|
| **Recovery Duration** | Risk of persistent symptoms (>28 days) is significantly higher in LD/ADHD cohorts. | Extend follow-up intervals; manage expectations for "Return-to-Learn." |
| **Baseline "Noise"** | Pre-existing ADHD symptoms mimic mild TBI. | Use individualized “change from baseline” rather than normative means. |
| **Comorbidity Load** | Cumulative risk increases with each diagnosis (e.g., ADHD + Dyslexia). | Prioritize multi-modal support (Academic + Pharmacological). |
| **Valid Baseline** | IImPACT scores | Supplement with clinical interview and bedside neuro-exam. |

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