



UW PACC

Psychiatry and Addictions Case Conference

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A TALE OF CHICKENS & EGGS: TBI, LD, & ADHD

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OBJECTIVES

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

CASE

- How should I talk about this with my child?
- > **41 y/o adult with history of LD and recent TBI reports worsening LD symptoms after TBI**
- > **They wonder if they are linked and how**
- > **Also they wonder if they should let their child play sports or what/ if anything to know about LD & head injury**

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?**

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**

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 * Has difficulty sustaining attention in tasks or play * Does not seem to listen when spoken to directly * Fails to follow through on instructions or finish work * Has difficulty organizing tasks and activities * Avoids or dislikes tasks requiring sustained mental effort * Loses things necessary for tasks (e.g., keys, wallet, phone) * Is easily distracted by extraneous stimuli * Is forgetful in daily activities

ADHD

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

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

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 - minor 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**

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 + LD).	Prioritize multi-modal support (Academic + Pharmacological).
Valid Baseline	IImPACT scores	Supplement with clinical interview and bedside neuro-exam.

TAKE HOME POINTS:

- > 1. Direction of effect: Consistent prolongation of recovery in ADHD and dyslexia**
- > 2. Magnitude: Typically 1–3 weeks longer, higher risk of symptoms >28 days**
- > 3. Mechanism: Baseline cognitive differences, symptom overlap, reduced cognitive reserve**
- > 4. Best practice: Baseline testing, early accommodations in school/work, avoid over-rest**

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