Online Learning Modules: Understanding the Intersection between Brain Injury and Mental Health Conditions

COLORADO
Department of Education

Provided by:

The Exceptional Student Services Unit

Brain Injury Team

Speaker: Karen McAvoy, PsyD

Dually credentialled as a clinical psychologist and school psychologist

<u>Current Experience:</u>

- Author of REAP; co-founder of GetSchooledOnConcussions.com
- Neurocognitive Assessment & Treatment, Brain Injury Educational Consulting Colorado, LLC

<u>Past Experience:</u>

- 20 years at Cherry Creek Schools as a school psychologist; Coordinator of the Mental Health Team, Brain Injury Team, and Manifestation Determinations
- 11 years as a consultant to Colorado Department of Education
- Former adjunct professor @ UCD School Psychology Program
- Pediatric Psychologist at Seattle and Denver Children's Hospitals and Director of the Center for Concussion, Rocky Mountain Hospital for Children

Department of Defense

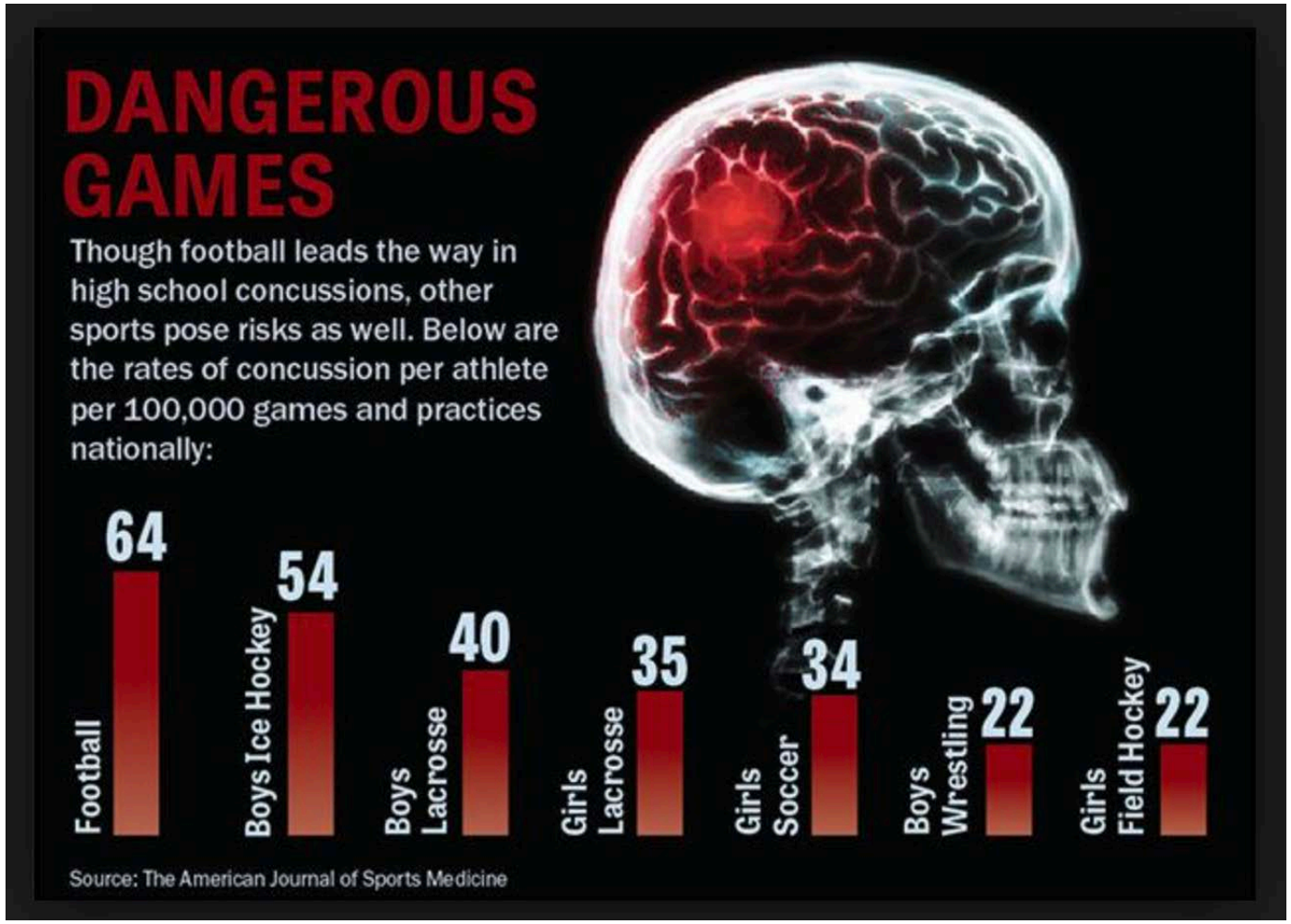
- One area of need among OEF/OIF Veterans is related to TBI and co-occurring mental health concerns. Military personnel serving in Iraq and Afghanistan are sustaining injuries while deployed (Terrio et al. 2009).

- In fact, TBI has been identified as a "signature injury" of the recent conflicts (Tanielian and Jaycox, 2008).

- Additionally, this cohort is reporting a variety of psychiatric symptoms as well, including those associated with posttraumatic stress disorder (PTSD), depression (Tanielian and Jaycox, 2008), and substance use disorder (Seal et al., 2011).

Concussions/Brain Injuries happen in sports

Sports as a Laboratory Assessment Model (SLAM) 2001



Brain Injuries happen in non-athletic ways too!

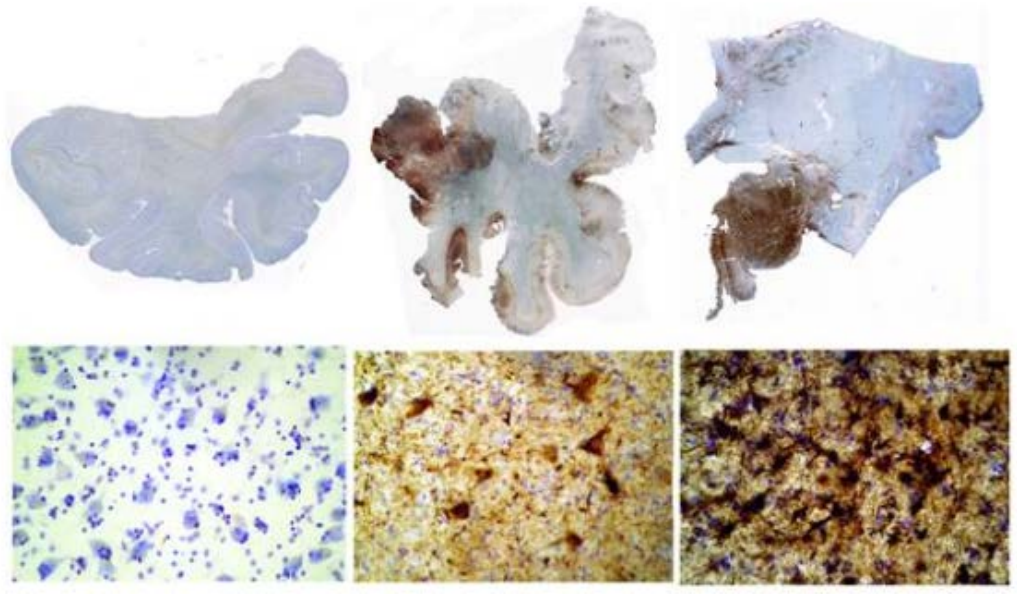
Harry Potter Sustained An Astoundingly Dangerous Number of Concussions

"Harry felt as if his head had been split in two."

Over 40% are getting concussions in non-sports related activities

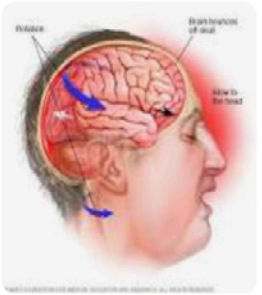
(Eagan-Brown, BrainSTEPS)

CTE (Chronic Traumatic Encephalopathy)



Source: Boston University Brain Bank: Images from Website, Dr. Ann McKee

Symptoms



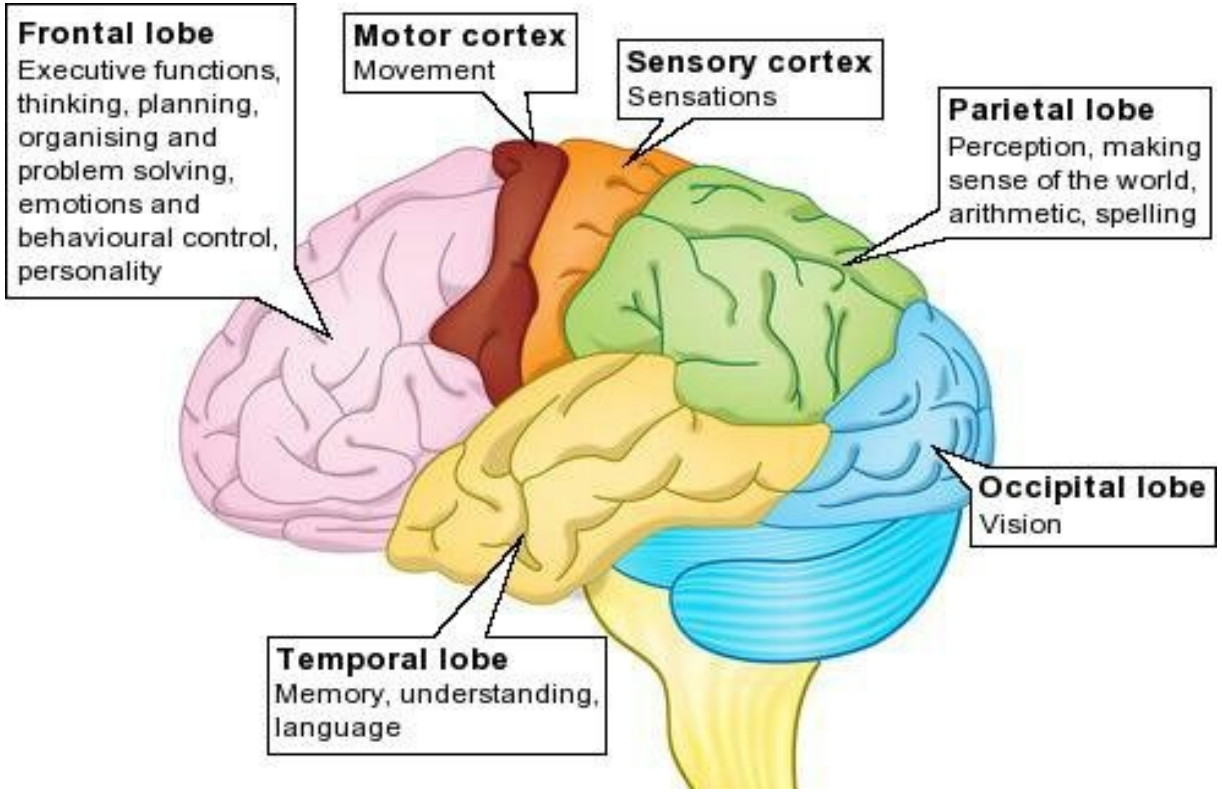
- **Difficulty thinking** (cognitive impairment)
- Impulsive behavior.
- **Depression** or apathy.
- **Short-term memory loss**.
- Difficulty planning and carrying out tasks (executive function)
- Emotional instability.
- Substance misuse.
- Suicidal thoughts or behavior.

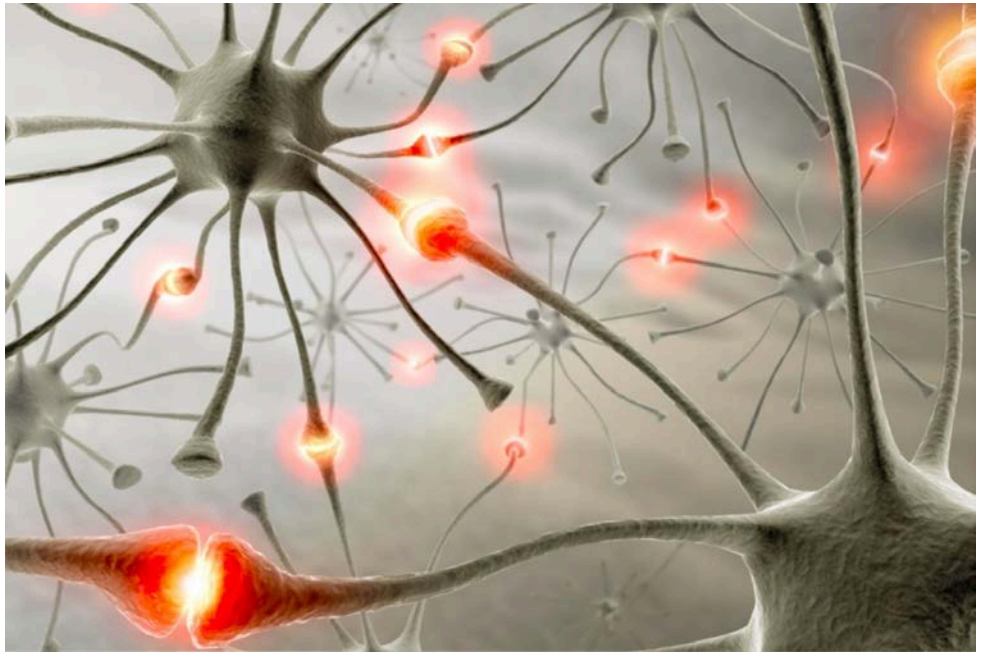
Jun 4, 2019

www.mayoclinic.org › symptoms-causes › syc-20370921

Chronic traumatic encephalopathy - Symptoms and causes ...

Structural and Biochemical



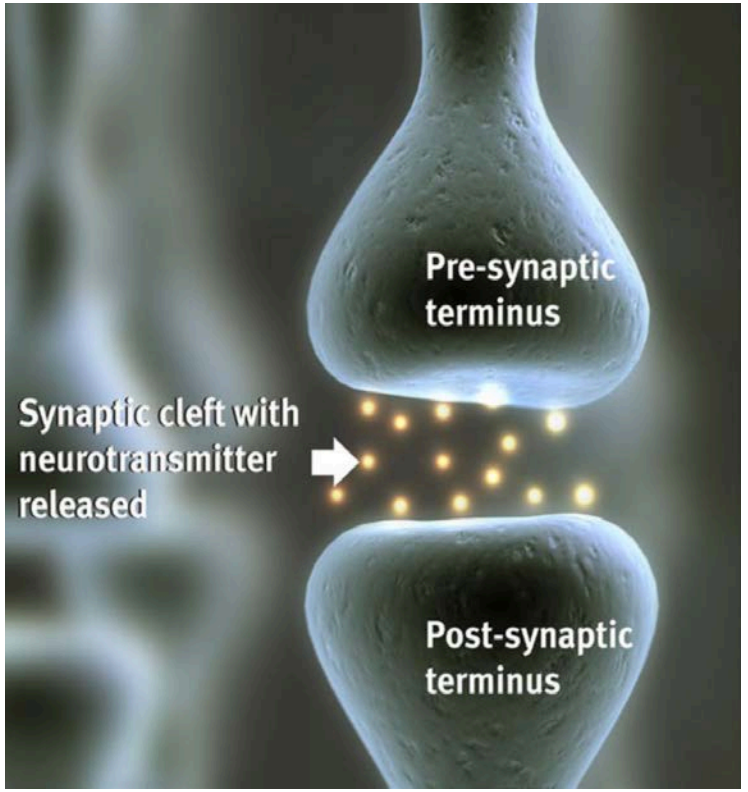


Problem with software, not hardware

Axonal Shearing and biochemical dysfunction

- Damage to individual nerve cells (neurons) and/or loss of connections among neurons which can lead to a breakdown of overall communication among neurons in the brain
- This damage contributes to the Metabolic Imbalance

Therefore, many brain injuries are not able to be detected on an MRI or CT scan



http://www.riken.jp/en/research/rikenresearch/highlights/4818

Symptoms = Functional problems

Physical:
- Headache
- Dizziness
- Nausea
- Light Sensitivity
- Noise Sensitivity

Cognitive:
- Difficulty concentrating
- Difficulty remembering
- Slow Processing Speed
- Cognitive Fogginess

Emotional:
- More emotional
- Sad
- Anxious
- Angry

Sleep:
- Fatigue
- Drowsiness
- Sleeping too much
- Can't fall or maintain sleep

Types of Traumatic Brain Injuries

- Mild TBI (LOC <30 min; PTA< 24 hours) => also commonly called a concussion (on average= 80-85%)
- Moderate TBI (LOC >30 min <24 hours; PTA 24 hours-7days) (on average = 13%)
- Severe TBI (LOC > 24 hours; PTA more than 7 days) (on average = 2%)

The severity of the injury does not solely determine the impact on functioning

What are the downstream consequences?

Children's Healthcare of Atlanta; Julie Haarbauer-Krupa, PhD & CDC TBI in Prisons and Jails: An Unrecognized Problem

Brain Injury's intersection with other conditions:

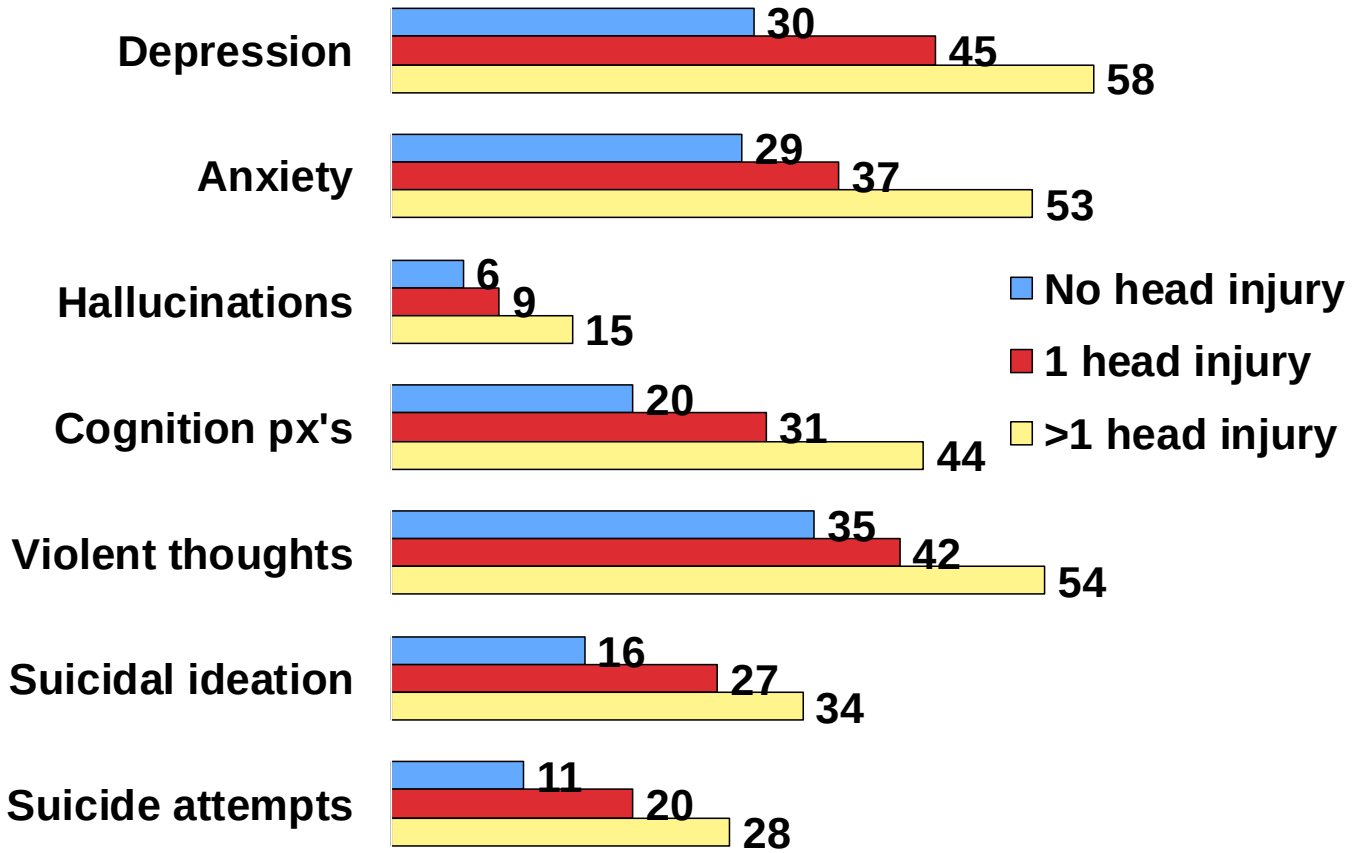
In a meta-analysis, Shiroma (2010) found **60% of inmates report having experienced a head injury** or TBI as compared to **8.5% in a general population** reporting a history of TBI.

- Prisoners who have had head injuries may also experience **mental health problems** such as severe depression and anxiety, substance use disorders, difficulty controlling anger, or suicidal thoughts and/or attempts.

- Studies of prisoners' self-reported health indicate that those with one or more head injuries have **significantly higher levels of alcohol and/or drug use** during the year preceding their current incarceration.

Behavioral Health Symptoms in Kentucky Prisoners

(Walker, Hiller, Staton & Leukefeld, 2003)



Substance Use:

By age 25: Those hospitalized with 1st TBI before age 6 are 3 times more likely to have a diagnosis of either alcohol or drug dependence
Natural History of TBI to Age 25 from the Christchurch Birth Cohort (McKinlay et al., 2008)

Children under 5 years of age who suffer a traumatic brain injury are over 3.6 times more likely to exhibit substance abuse as teenagers, compared with uninjured children

Zachary M. Weil, Kate Karelina. **Traumatic Brain Injuries during Development: Implications for Alcohol Abuse**. *Frontiers in Behavioral Neuroscience*, 2017; 11
DOI: 10.3389/fnbeh.2017.00135

Mood Disorders:

Concussions may increase suicide risk

Fralick ML, et al. *JAMA Neurol.* 2018;doi:10.1001/jamaneurol.2018.3487.

Redelmeier DA, Bhatti JA. *JAMA Neurol.* Published online ahead of print.

November 12, 2018

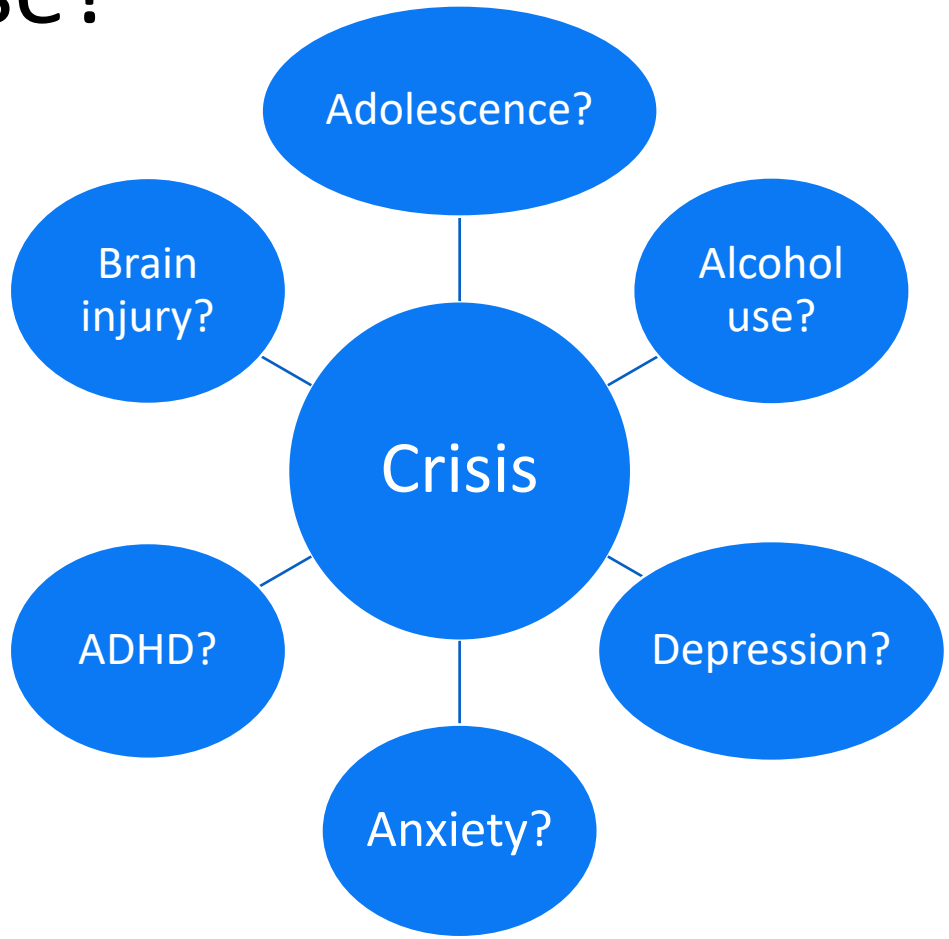
Researchers found sustaining a concussion and/or mild TBI was associated with a twofold higher risk for suicide (RR = 2.03; 95% CI, 1.47-2.8). Two studies with estimates after a median follow-up of about 4 years found 1,664 of 333,118 individuals (0.5%) and 750 of 126,114 individuals (0.59%) diagnosed with concussion and/or mild TBI died from suicide. Concussion was also associated with a higher risk for suicide ideation and suicide attempt. The heightened risk for suicide outcomes after concussion was consistent in studies with and without military personnel.

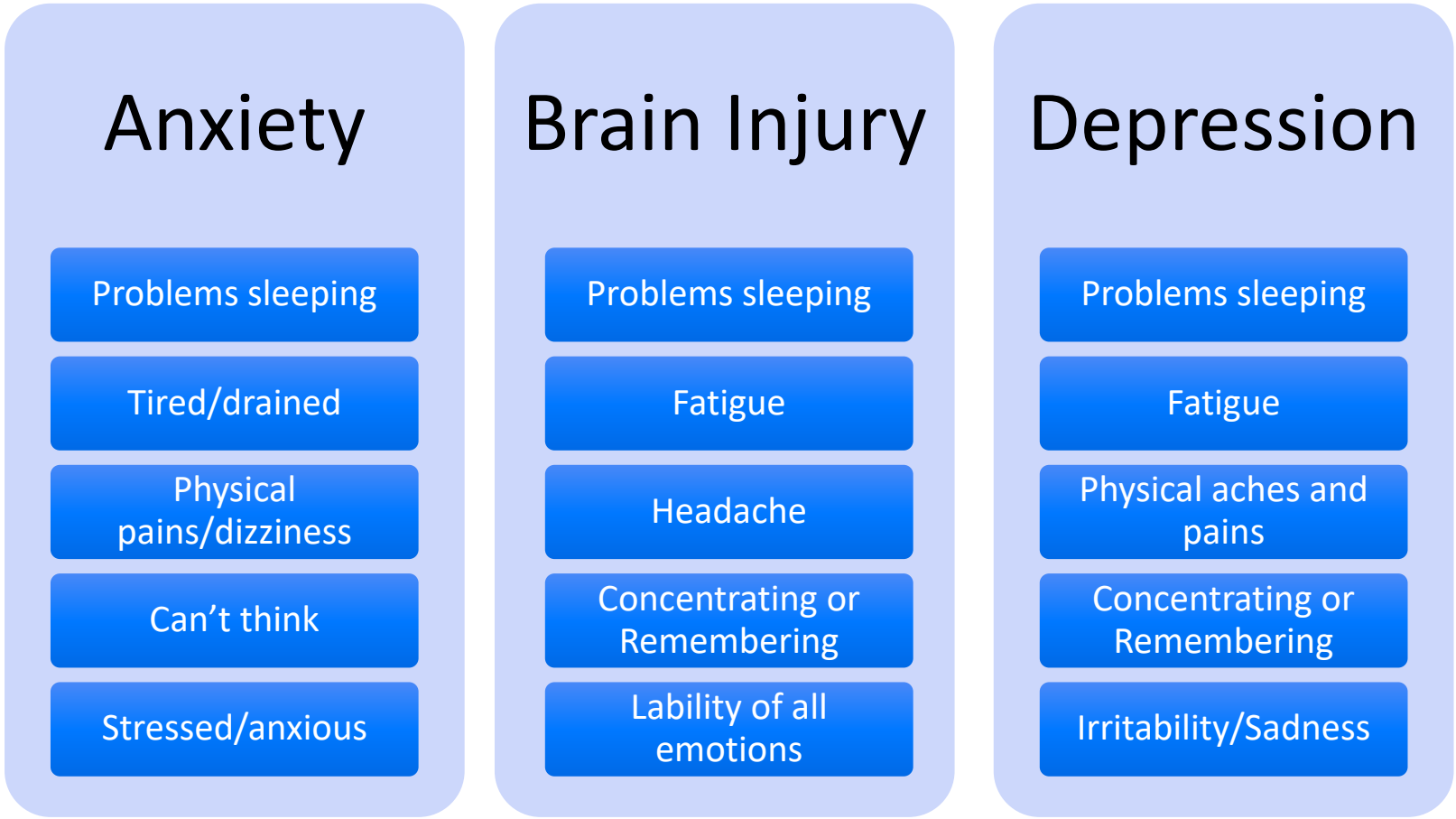
Mood and anxiety disorders following pediatric traumatic brain injury: a prospective study

Luis CA, Mittenberg W. J Clin Exp Neuropsychol 2002;24:270-9.

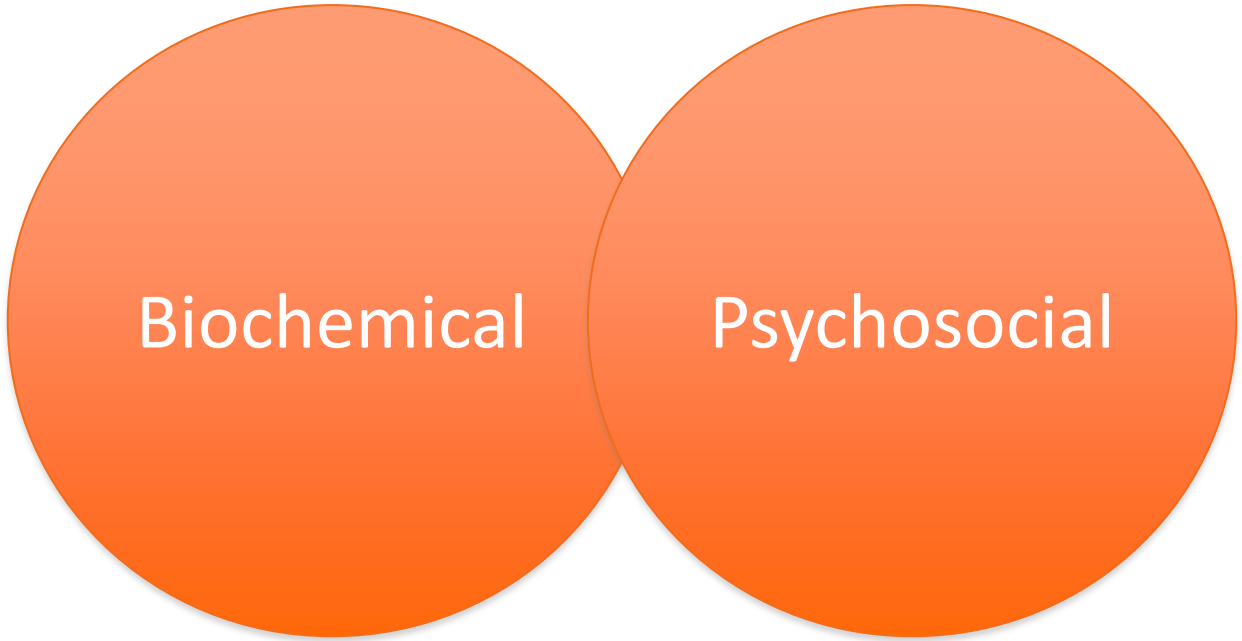
- Children (aged 6-15yr) hospitalized in a general hospital n= 42 with mTBI versus n=35 orthopedic controls.
- Prevalence of mood disorders at 6mo: mTBI group (35.7%), orthopedic group (11.4%).
- Prevalence of anxiety disorders at 6 months: mTBI group (21.4%), orthopedic group (2.8%)

A behavioral or mental health crisis happens – what is the cause?





Are emotional/behavioral issues biochemical or psychosocial following a brain injury?

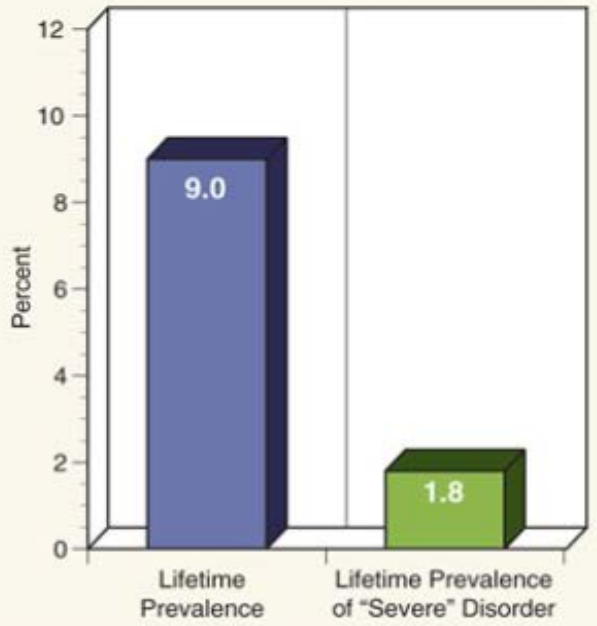


Attention Deficit Disorder:

Attention Deficit Hyperactivity Disorder

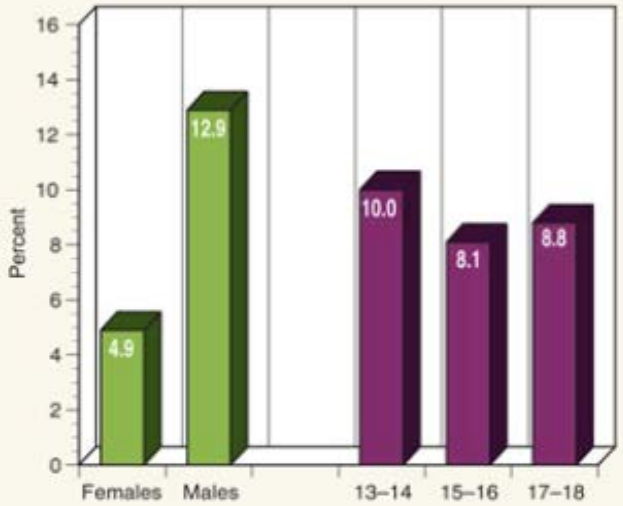
Lifetime Prevalence of 13 to 18 year olds

- **Lifetime Prevalence:** 9.0% of 13 to 18 year olds
- **Lifetime Prevalence of "Severe" Disorder:** 1.8% of 13 to 18 year olds have a "severe" disorder



Demographics (for lifetime prevalence)

- **Sex and Age**



- **Race:** Not Reported

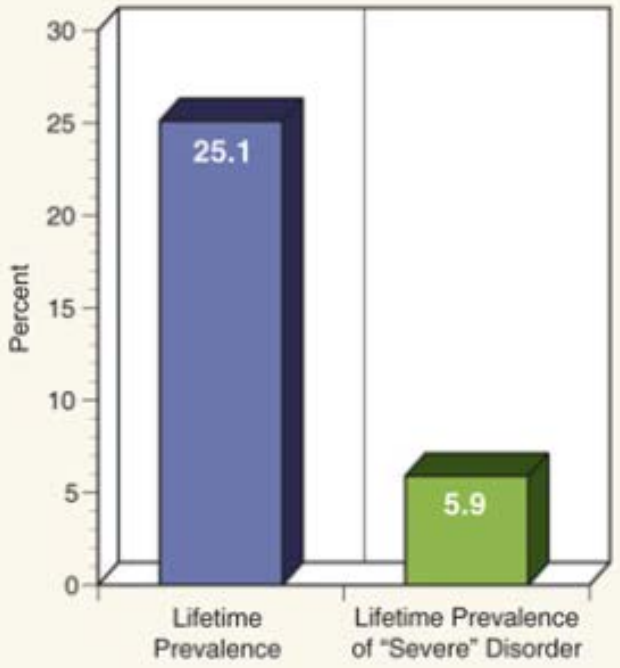
Merikangas KR, He J, Burstein M, Swanson SA, Avenevoli S, Cui L, Benjet C, Georgiades K, Swendsen J. Lifetime prevalence of mental disorders in U.S. adolescents: Results from the National Comorbidity Study-Adolescent Supplement (NCS-A). *J Am Acad Child Adolesc Psychiatry.* 2010 Oct;49(10):980-989.

NIH National Institute of Mental Health | Transforming the understanding and treatment of mental illnesses.

Anxiety:

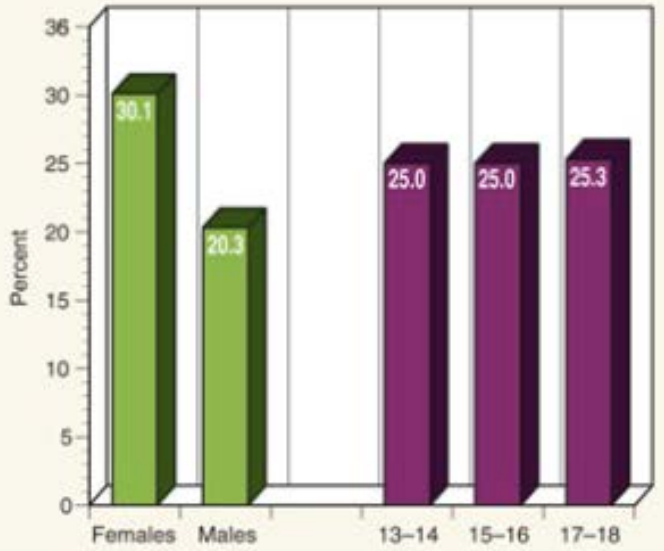
Lifetime Prevalence of 13 to 18 year olds

- **Lifetime Prevalence:** 25.1% of 13 to 18 year olds
- **Lifetime Prevalence of "Severe" Disorder:** 5.9% of 13 to 18 year olds have "severe" anxiety disorder



Demographics (for lifetime prevalence)

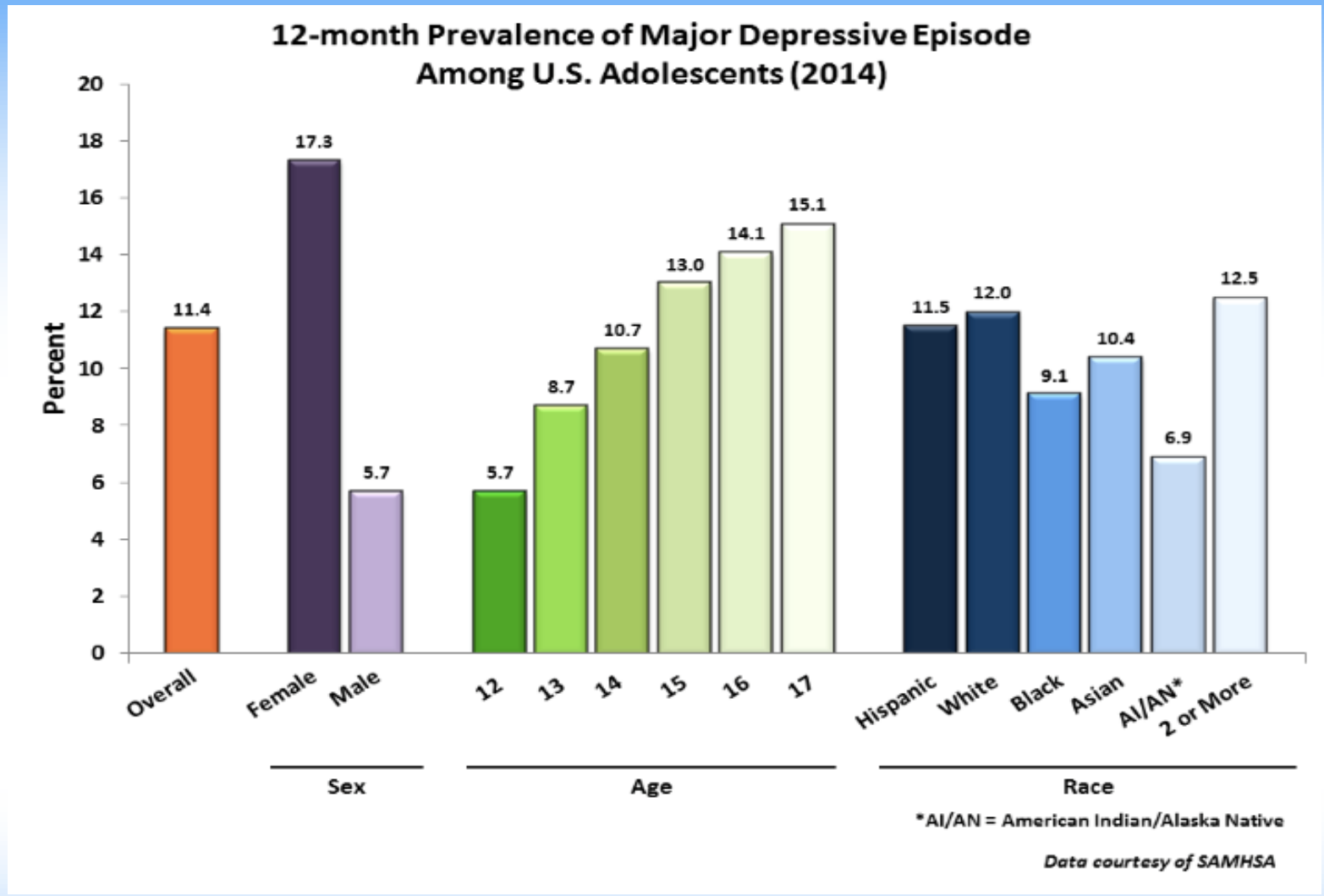
- **Sex:** Statistically different
- **Age:** Not statistically different



- **Race:** Statistically significant differences were found between non-Hispanic whites and other races

[1]Merikangas KR, He J, Burstein M, Swanson SA, Avenevoli S, Cui L, Benjet C, Georgiades K, Swendsen J. *Lifetime prevalence of mental disorders in U.S. Adolescents.* Under review.

Depression:


12-month Prevalence of Major Depressive Episode
Among U.S. Adolescents (2014)
Percent
20
18
16
14
12
10
8
6
4
2
0
11.4
17.3
5.7
5.7
8.7
10.7
13.0
14.1
15.1
11.5
12.0
9.1
10.4
6.9
12.5
Overall
Female
Male
12
13
14
15
16
17
Hispanic
White
Black
Asian
AI/AN*
2 or More
Sex
Age
Race
*AI/AN = American Indian/Alaska Native
Data courtesy of SAMHSA

Is it Biochemical?

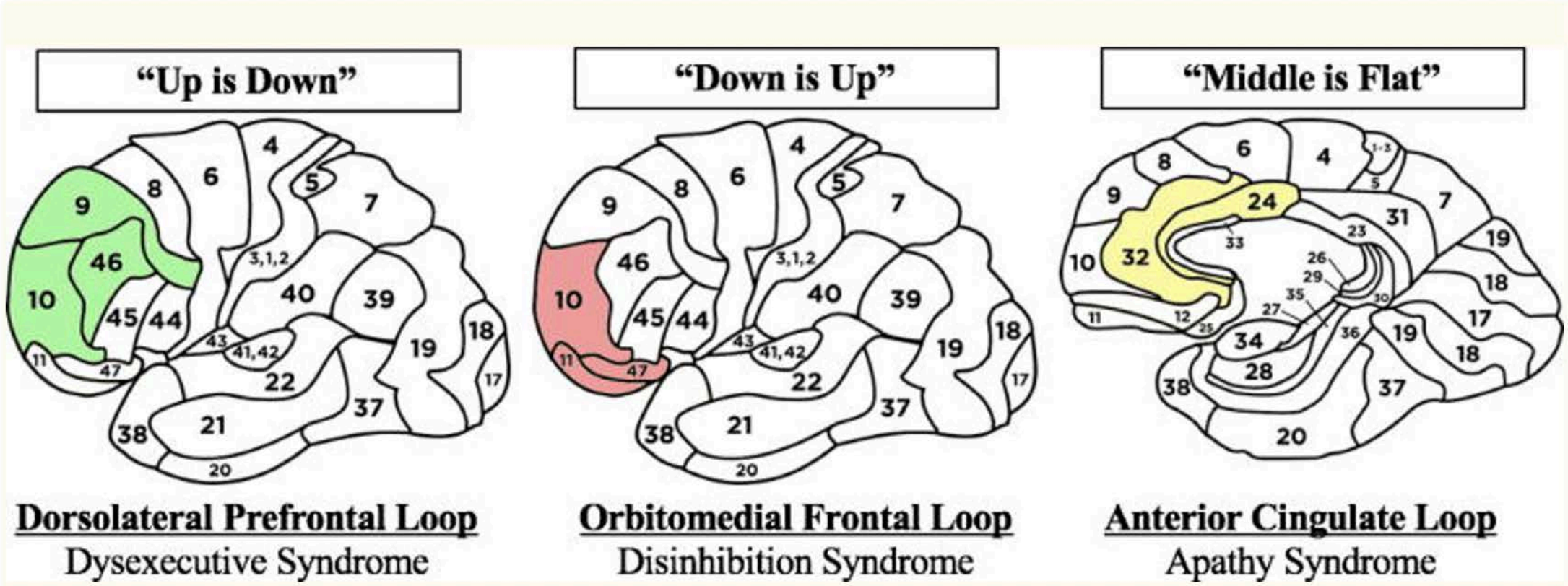
Biochemical
ADHD = 9%
Anxiety = 25%
Depression = 11%

Psychosocial

"Kindling effect"

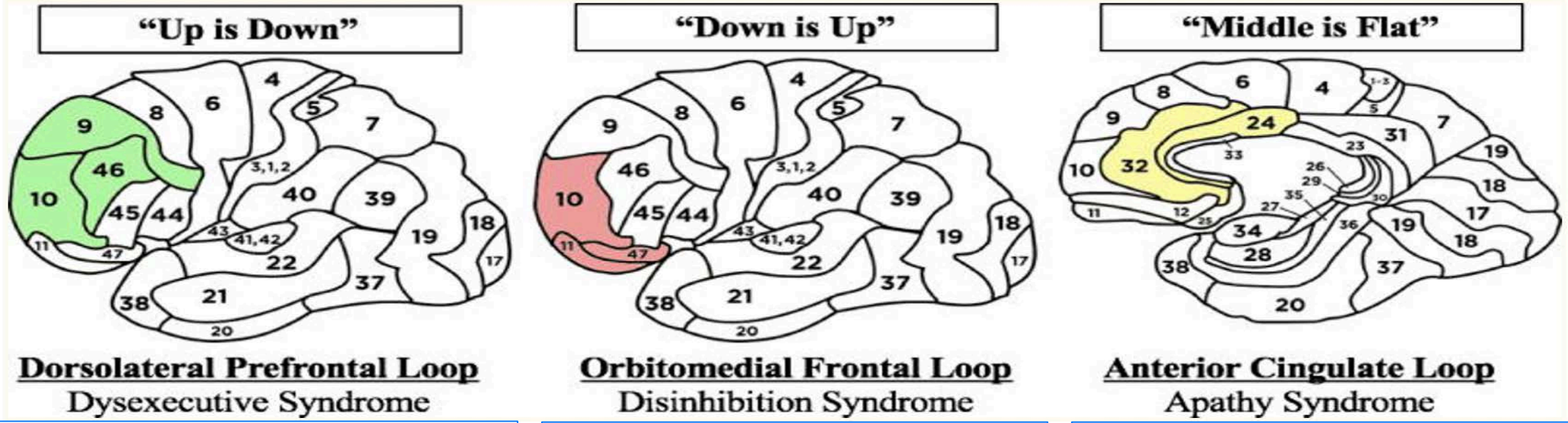
Source: National Institute of Mental Health & SAMSHA

The Neuroanatomic Correlates of Syndromal Presentations after Traumatic Brain Injury



Bonelli RM, Cummings JL. Frontal-subcortical circuitry and behavior. Dialogues Clin Neurosci. 2007;9(2):141–151.

Peters, M.E., Moussawi, K. & Rao, V. Teaching Clinical Reasoning with an Example Mnemonic for the Neuropsychiatric Syndromes of Traumatic Brain Injury. *Acad Psychiatry* **42,** 686–689 (2018). https://doi.org/10.1007/s40596-017-0831-0



Damage to upper frontal lobes => decreased ability to act as executive => Trouble with:

- Retrieving stored memories
- Remembering word lists
- Alternating between tasks
- Manipulating abstractions
- Inhibiting reflexive responses

Damage to lower frontal lobes => increased inappropriate behaviors.
Trouble with:

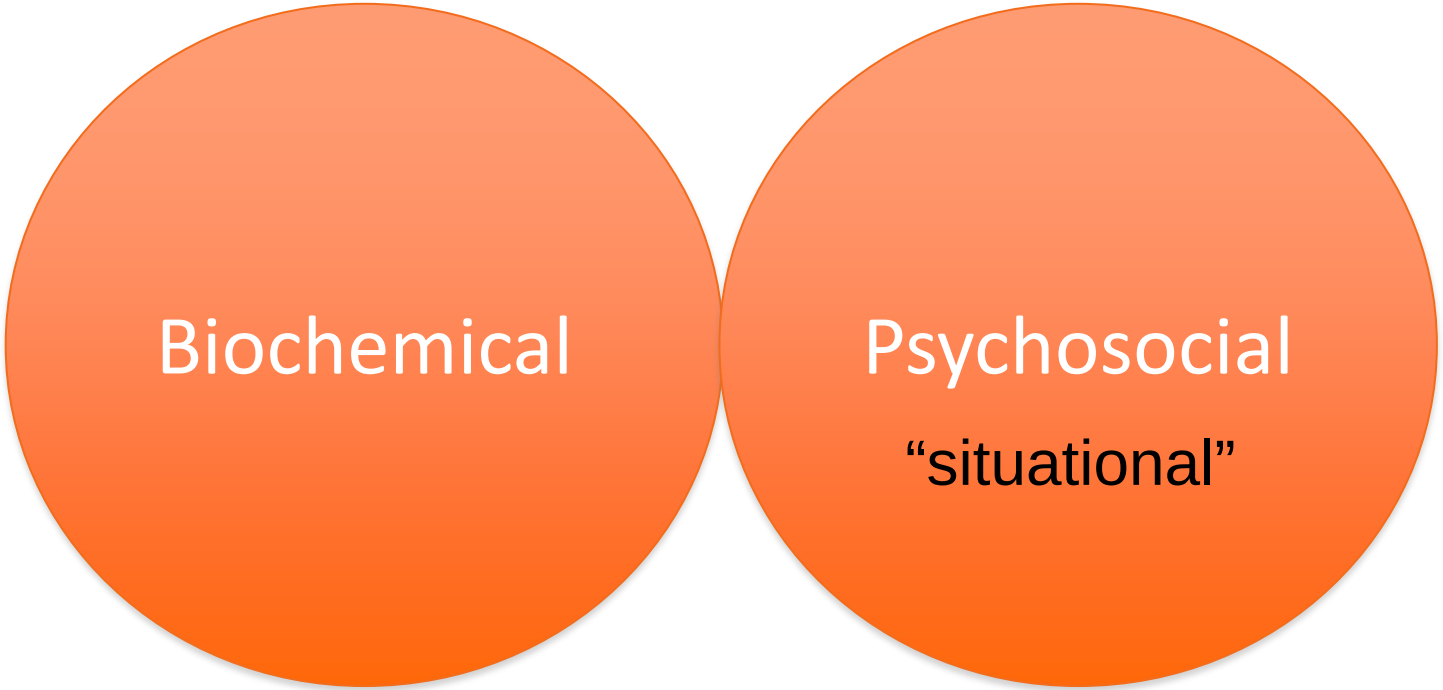
- Emotional lability
- Impulsivity
- Lack of social tact

Damage to middle frontal lobes => apathy
Trouble with:

- Flattening of affect
- Displays no passion
- Displays no motivation

Peters, M.E., Moussawi, K. & Rao, V. Teaching Clinical Reasoning with an Example Mnemonic for the Neuropsychiatric Syndromes of Traumatic Brain Injury. *Acad Psychiatry* **42,** 686–689 (2018). https://doi.org/10.1007/s40596-017-0831-0

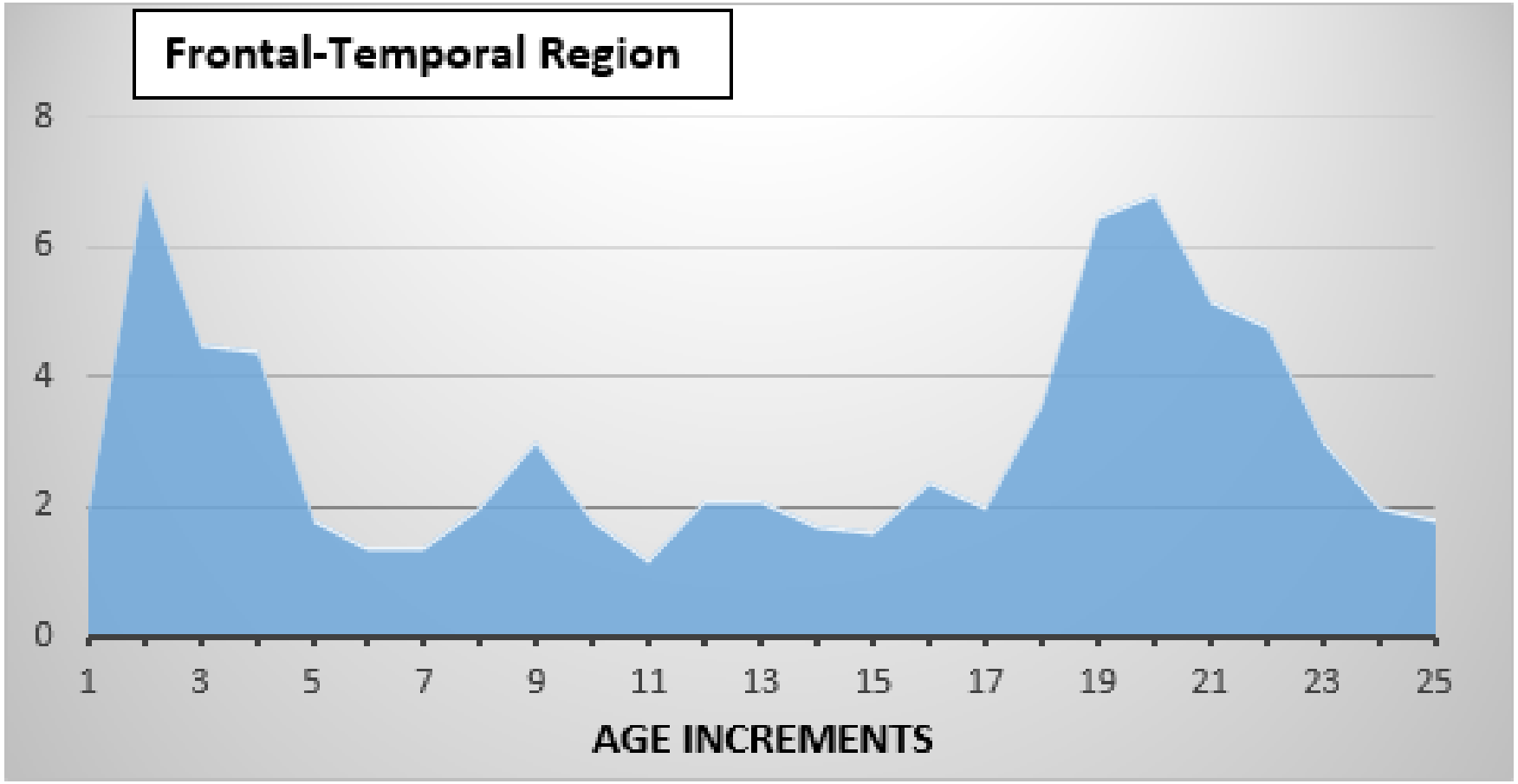
Is it situational?



Situational and Emotional Spin-off’s

- Socially isolated
- Missing out on important developmental events
- Behind at school
- Loss of independence
- Perception of inadequacy
- Decline of self-confidence

Maturation and Development:



(Adapted from Savage, 1999)

Executive Function:

"The teenage brain is like a Ferrari: it's sleek, shiny, sexy, and fast, and it corners really well. But it also has really crappy brakes."

Dawson/Guare-May 2012

Building Blocks of Brain Development ©

The Hierarchy of Neurocognitive Functioning © - created by Peter Thompson, Ph.D. 2013, adapted from the works of Miller 2007; Reitan and Wolfson 2004; Hale and Fiorello 2004.

The Building Blocks of Brain Development © – further adapted by the CO Brain Injury Steering Committee, 2016.

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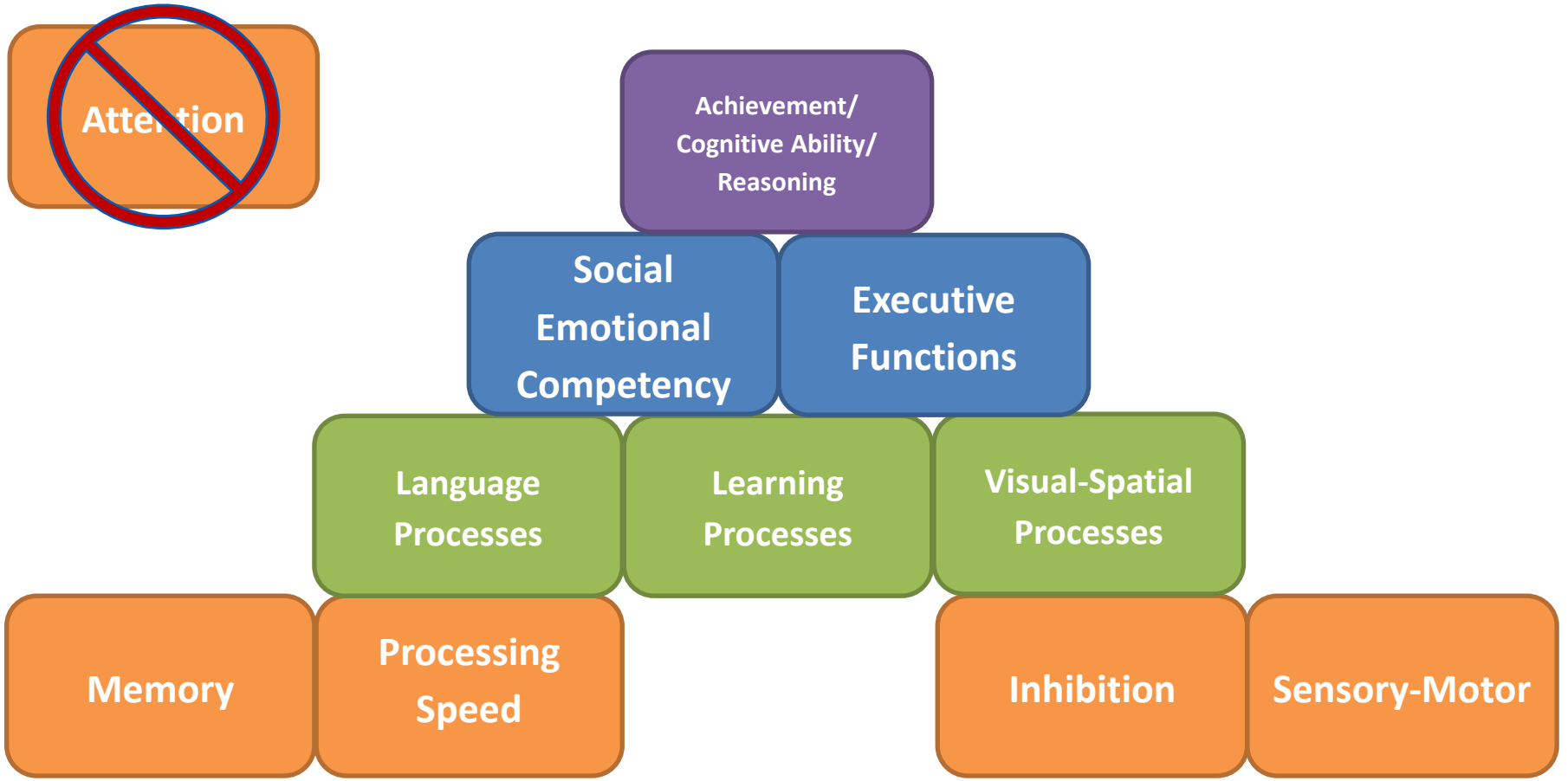

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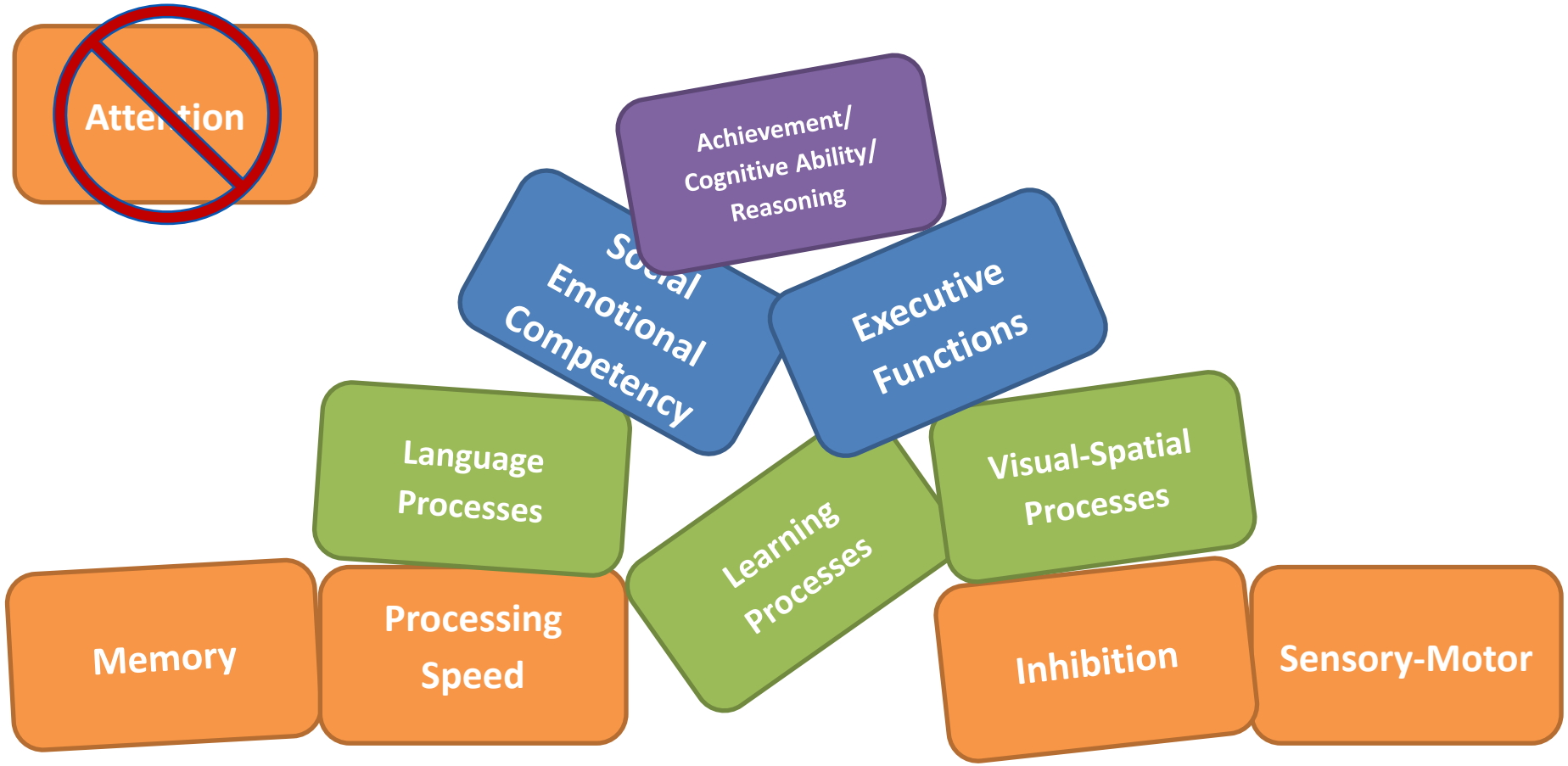

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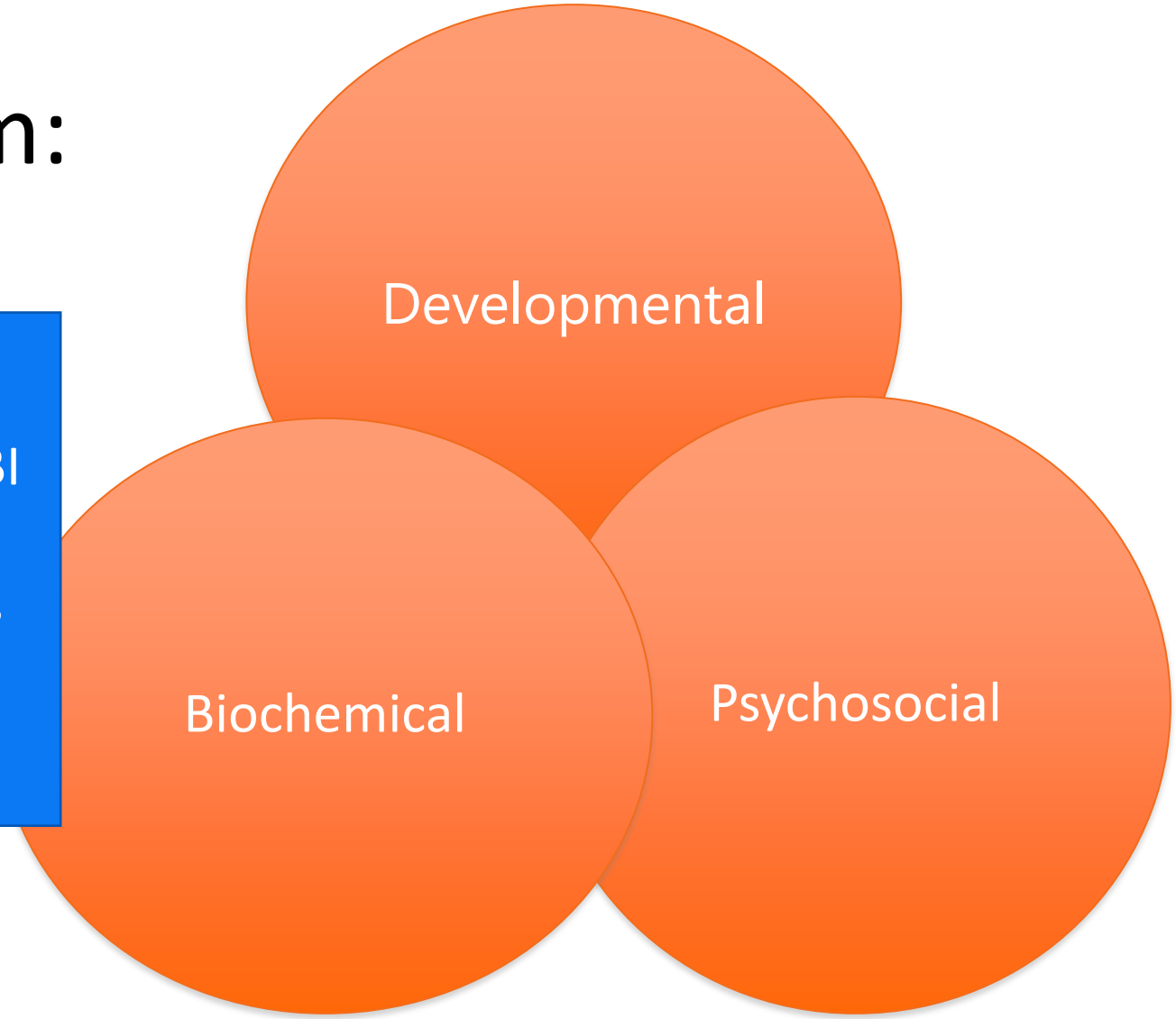
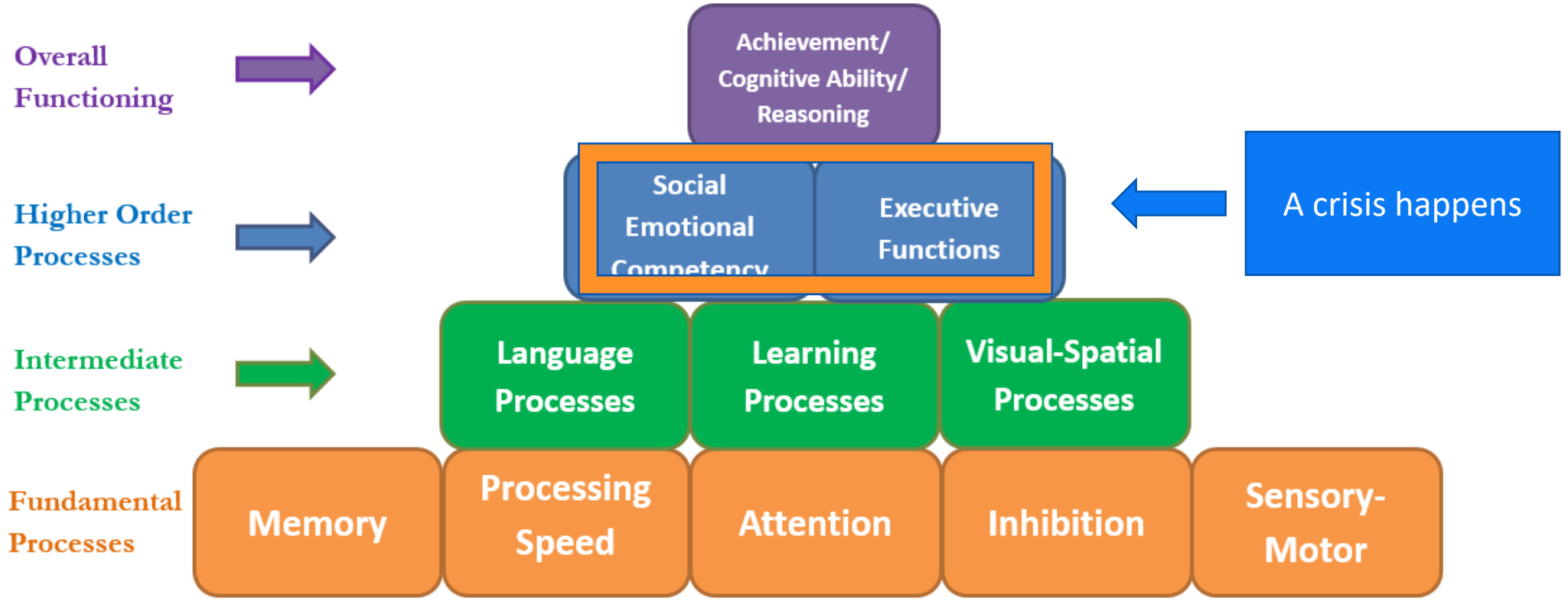
Perfect Storm:

Brain injury, even a mild TBI like a concussion, is the great AMPLIFIER!



What Does This Mean?



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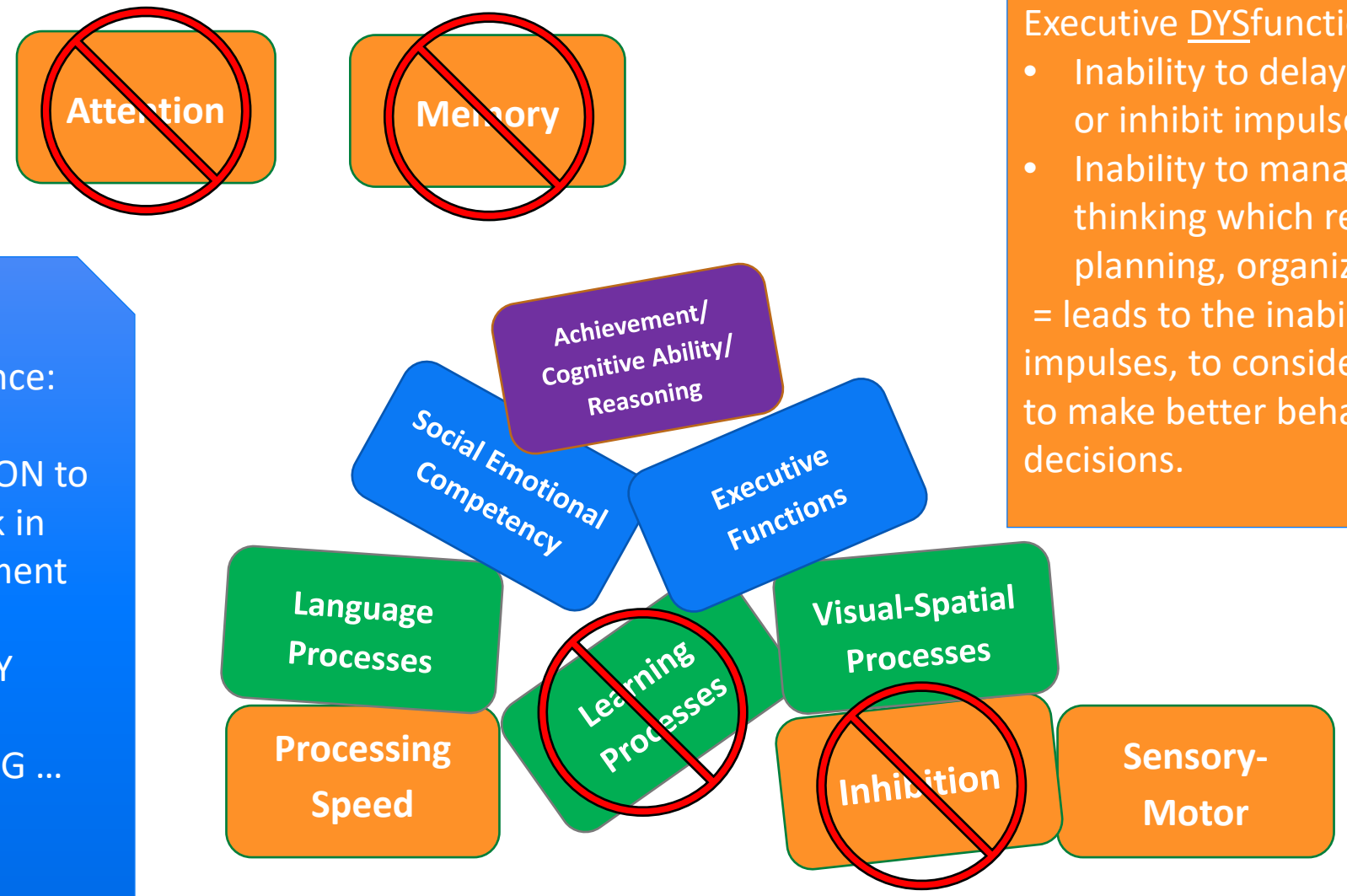
Social INcompetence:

- Lack of ATTENTION to feedback in environment
- Poor MEMORY
- Poor LEARNING …

= leads to repetitive mistakes



Executive DYSfunction:

- Inability to delay gratification (wait) or inhibit impulses
- Inability to manage time – no future thinking which results in poor planning, organization or initiation …

= leads to the inability to delay impulses, to consider other options and to make better behavioral or social decisions.

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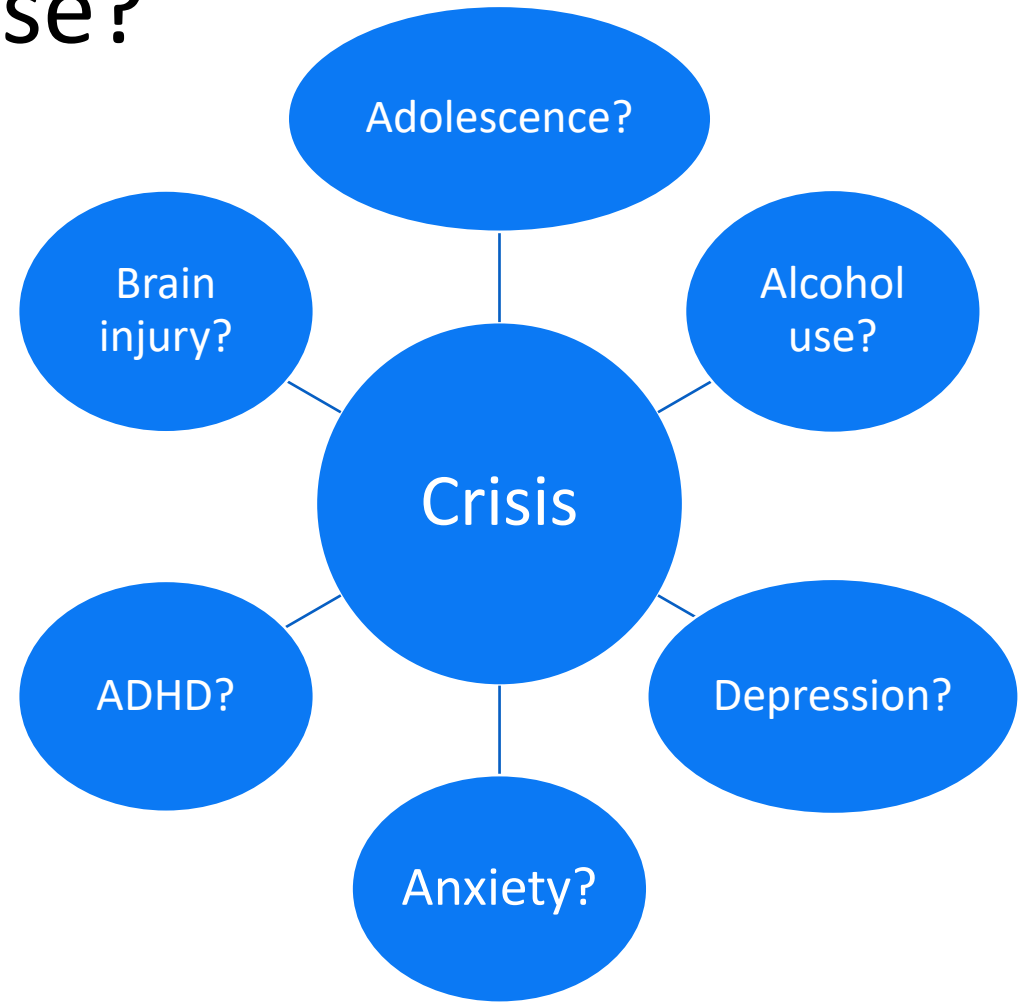
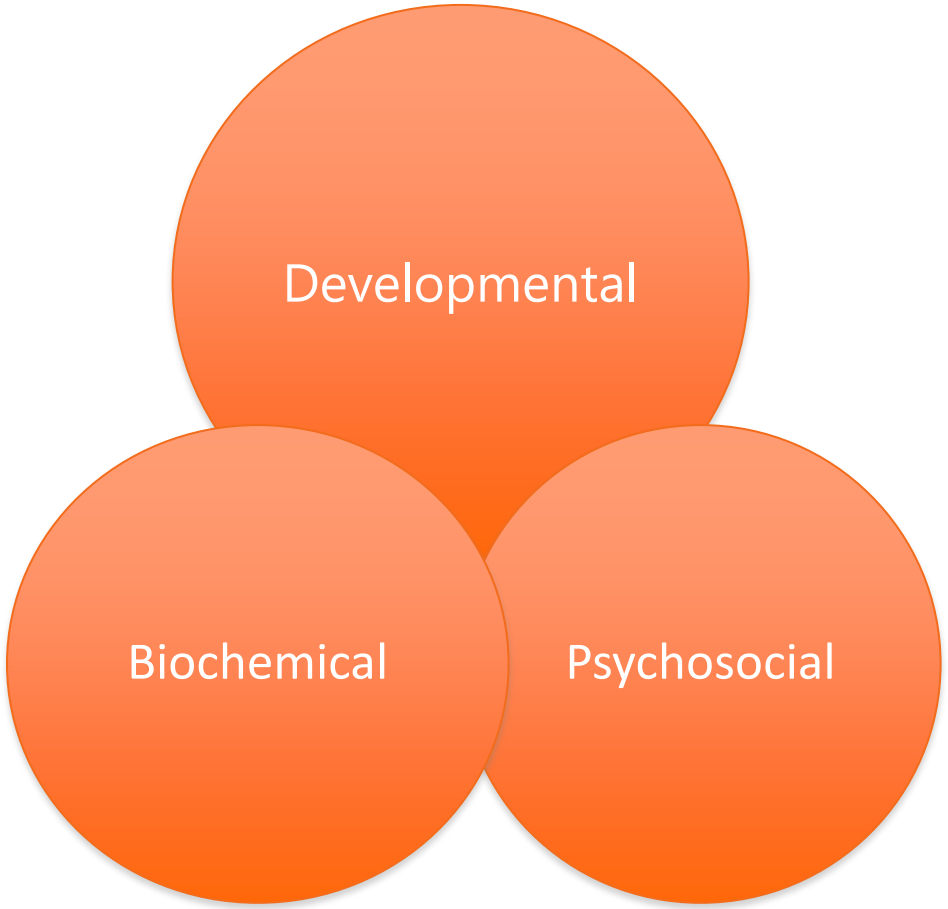
When a mental health crisis happens – what is the cause?



Emma:

- 14 year old girl
- Motor vehicle crash in March; 2 prior concussions from soccer
- Suffered a fractured skull (left temporal area) and a hematoma
- Hospitalized for 4 days, sent home to rest – no rehabilitation (no PT, OT or speech)
- Missed a lot of school in April and May of 8th grade year because of symptoms flaring off and on
- Caught sneaking beer with older cousin at grandma's house over summer => behavioral crisis!
- Started 9th grade (entering high school) – easily frustrated, easily angered, short temper, crying jags, inconsolable crying, learning struggles, attentional struggles, peer altercations => learning and social crisis!
- End of October – "I hate school, I have no friends…" I hate myself"; "I want to die" => mental health crisis!

Is it Developmental?

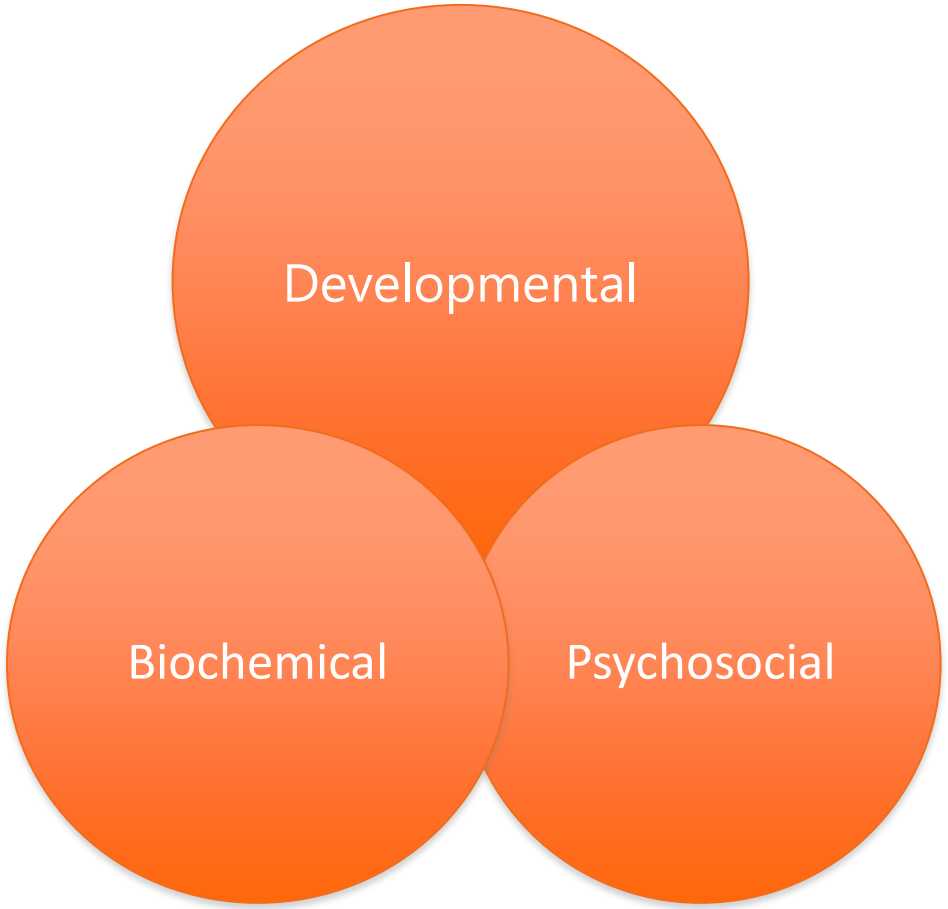


Compared to other 13-14 year old girls, should we expect Emma to have developed:

- Emotion/frustration regulation?
- Verbal expression?
- Ability to wait/delay and problem solve?
- Competent peer interactions?
- Ability to attend?
- Strong learning skills?
- Emerging executive functioning?

What were her developmental skills like pre & then post-BI?

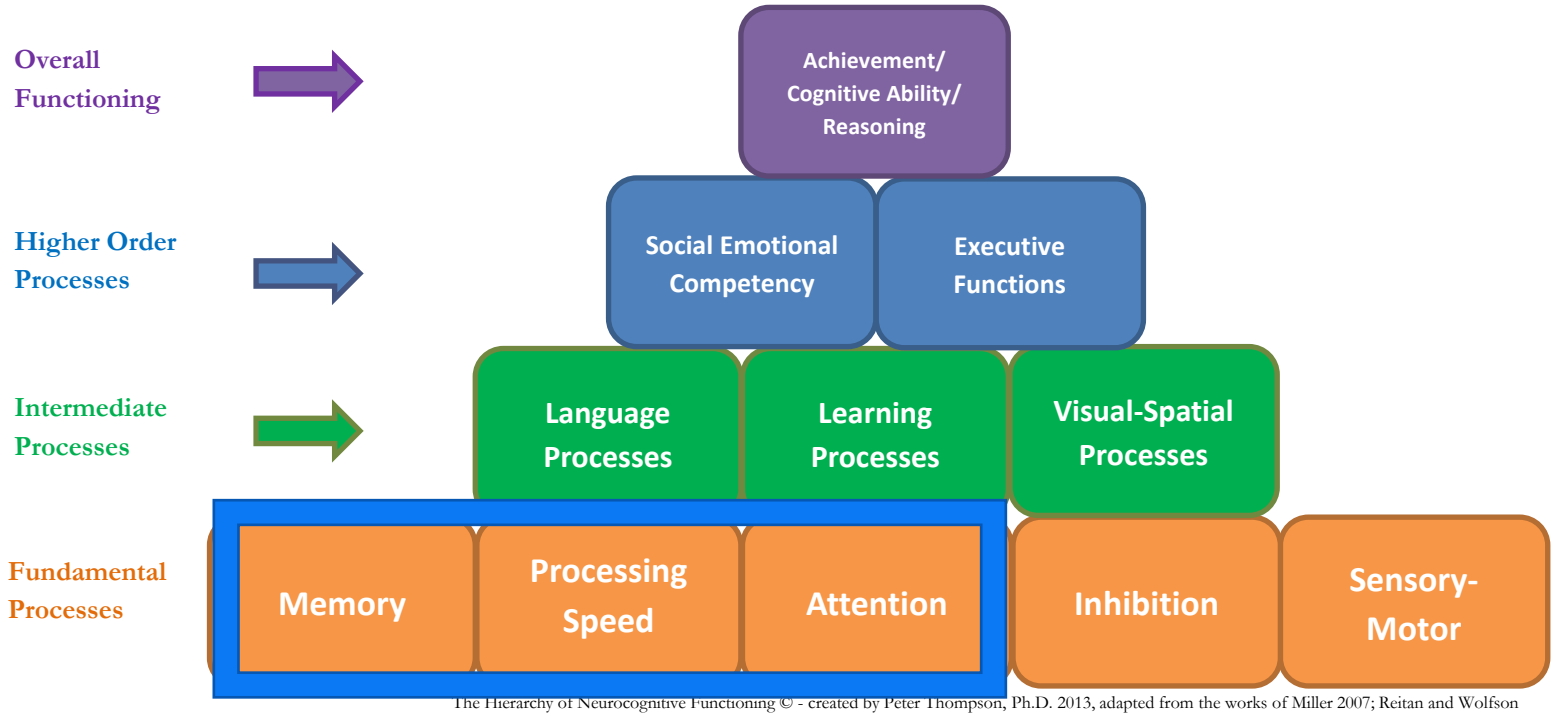
Is it Psychosocial?



Is Emma frustrated and angry because the brain injury has led to:

- Having to resign from soccer?
- Being restricted from other contact sports?
- Missing social interactions during the end of 8th grade year?
- Being "singled out" in 9th grade – on "watch" for recess and PE, having to get special interventions academically?
- Feeling upset and angry with herself because academics and social interactions are not as successful as before and that is embarrassing?

Is it Psychosocial?



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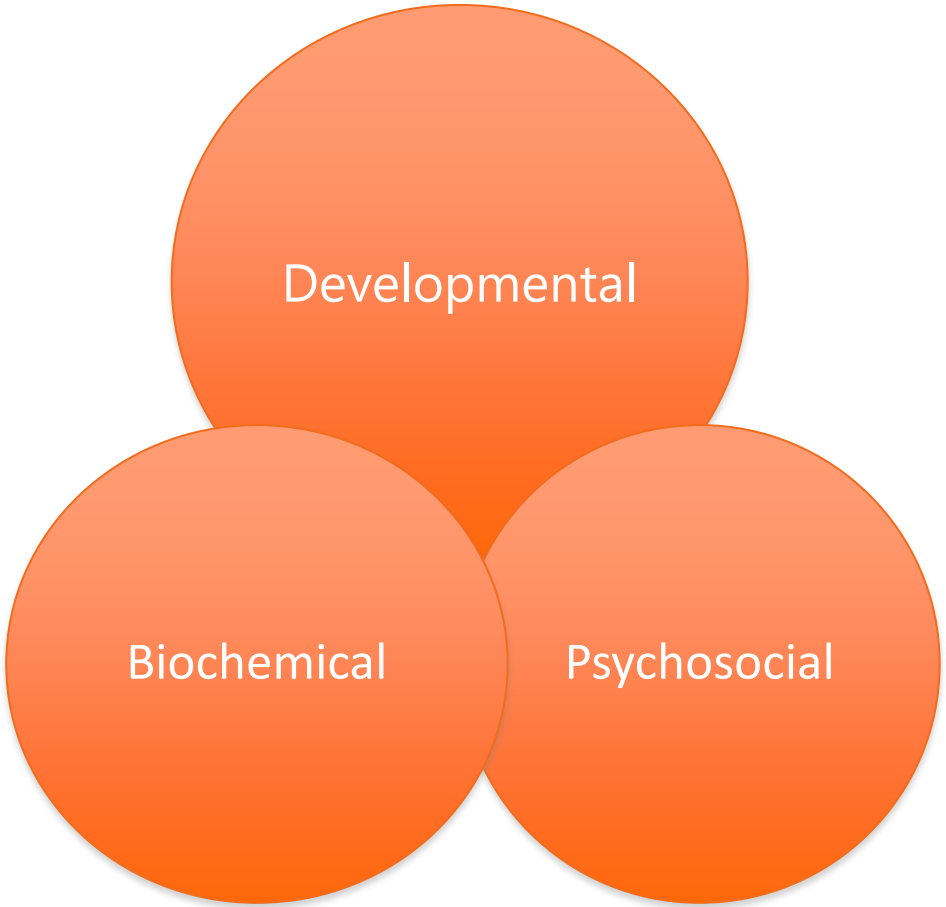
- Slow processing speed
- Poor memory
- Compromised attention

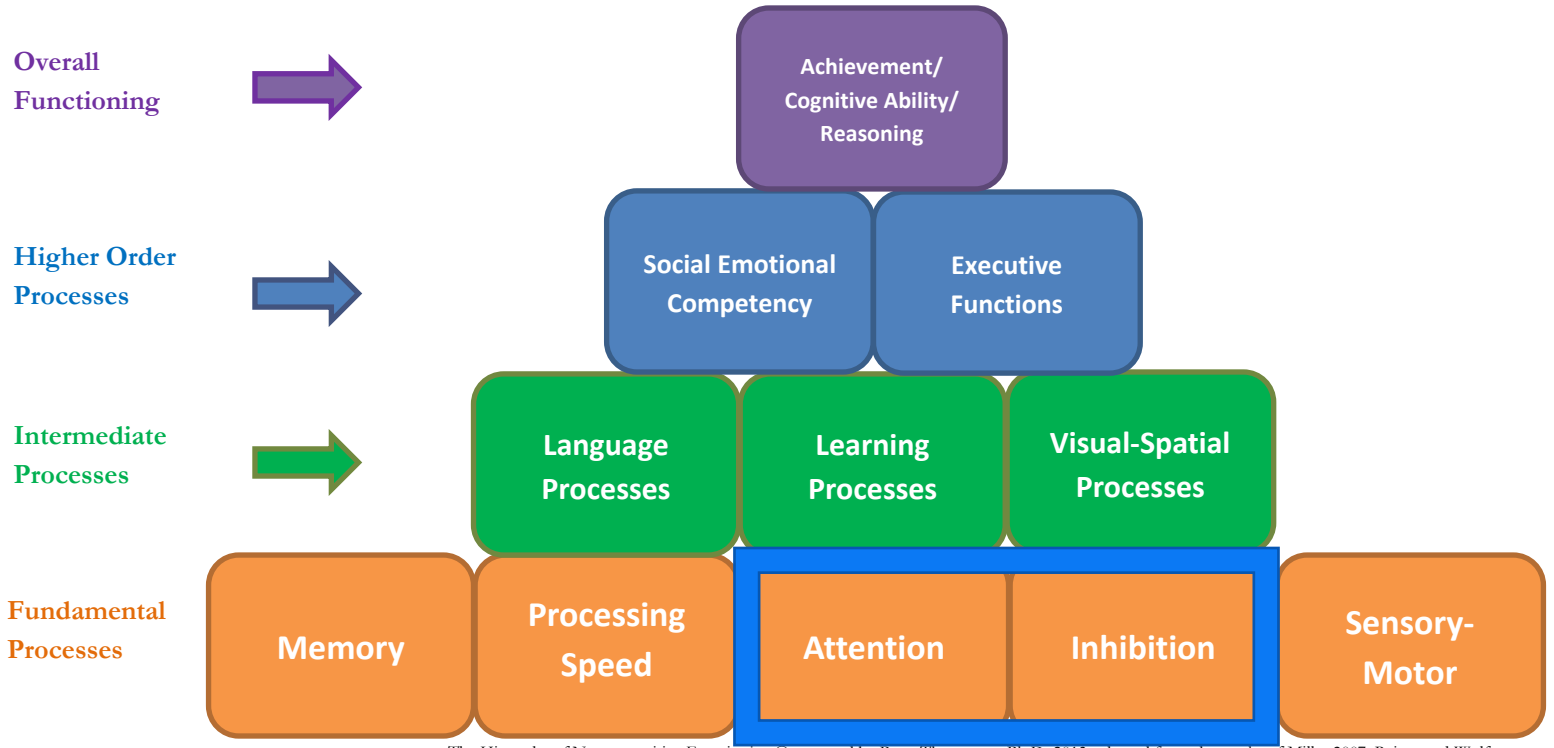
Is it Biochemical?

Has the brain injury fundamentally changed the biochemistry of the brain? This is hard to know in a developing brain because some MH diagnoses manifest later in adolescence or early adulthood.
Emma's biological father was diagnosed with bipolar disorder. He is not in Emma's life.

Or was Emma prone to attentional issues, anxiety or depression that were exacerbated by the brain injury? Brain Injury is the great amplifier because of the lack of "inhibition".



Is it Biochemical?



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It might be all…

Take Away Points:

- Any child or adolescent who sustains a brain injury, mild, moderate or severe, is vulnerable to developmental, psychosocial and biochemical consequences. It is best to consider how each one of those issues contributes to behavioral, learning, social and mental health manifestations.

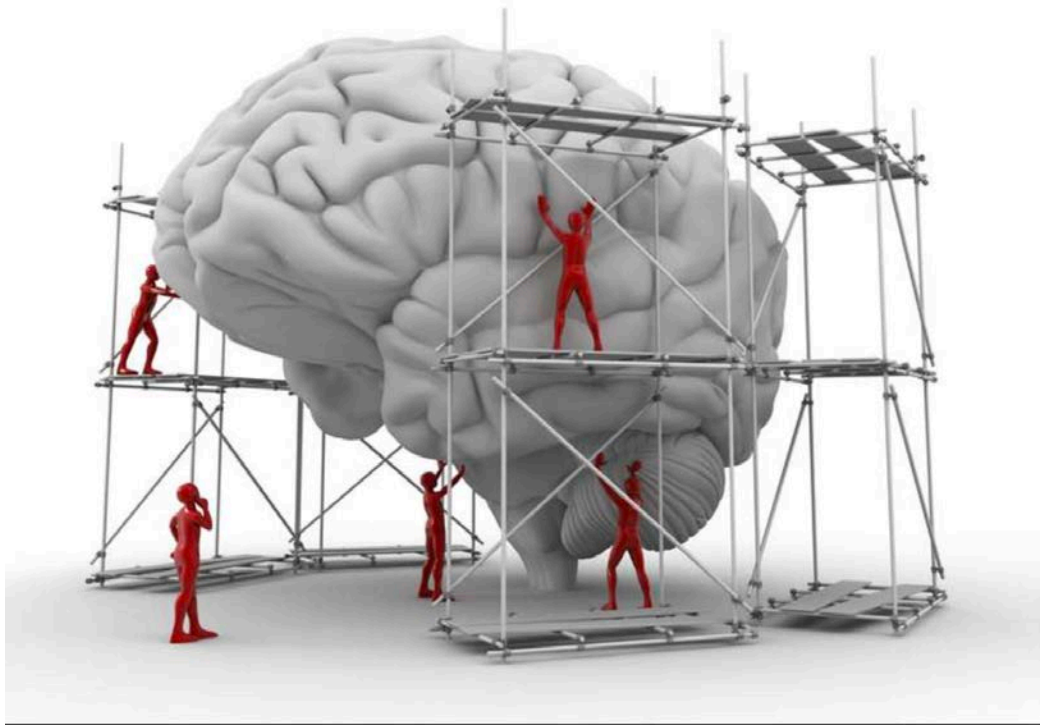
- Regardless of the etiology of the “crisis”, know that experiencing a brain injury can be felt very acutely by a child/adolescent for multiple reasons. This, in conjunction with a compromised ability to delay impulses and consider better options, warrants supportive understanding and close monitoring.

Take Away Points:

- The behavioral or mental health crisis, secondary to a brain injury, needs to be treated by both a mental health professional and brain injury professionals. Brain injury recovery and rehabilitation takes time and patience. It cannot be the first line of defense when depression or suicidality is imminent. Mental health stabilization needs to happen before brain injury rehabilitation can be effective.

- A brain injury will likely cause skill deficits on the fundamental level – leaving processing speed, memory, attention and inhibition compromised (even temporarily). Inefficient fundamental building blocks can cause social INcompetence and Executive DYSfunction so start interventions on the fundamental level.

Questions?



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CO Brain Injury Resources

- CO Department of Education – Exceptional Student Services Unit:
  - Brain Injury in Children & Youth: A Manual for Educators http://www.cde.state.co.us/cdesped/sd-tbi
  - Building Blocks of Brain Development - www.cde.state.co.us/cdesped/sd-tbi_buildingblocks
- Colorado Kids Brain Injury Resource Network: Includes an online, user friendly, clickable version of the Building Blocks of Brain Development with the Assessment component - http://cokidswithbraininjury.com/educators-and-professionals/brain-injury-matrix-guide/
- Article: Neuroeducational Evaluations – The School-Based Answer to Pediatric Neuropsychological Assessments (2017. Crawford, N., Hotchkiss, H., McAvoy, K.)
- Website for Parents and Professionals: www.COKidswithbraininjury.com
- Brain Check Survey: http://www.lobi.chhs.colostate.edu/index.aspx

BrainSTEPS CO

Strategies Teaching Educators, Parents, & Students

A BRAIN INJURY SCHOOL RE-ENTRY CONSULTING PROGRAM

- Brain Injury School Consulting Program
- In many Districts/BOCES across the state
- Inter-disciplinary Consultation Team
- Trained in brain injury and The Building Blocks of Brain Development©
- Funded in partnership by:

COLORADO Department of Education | CDHS | MINDSOURCE BRAIN INJURY NETWORK

For more information go to: http://www.cde.state.co.us/cdesped/brainsteps

Brain Injury Alliance COLORADO

MINDSOURCE BRAIN INJURY NETWORK

Services

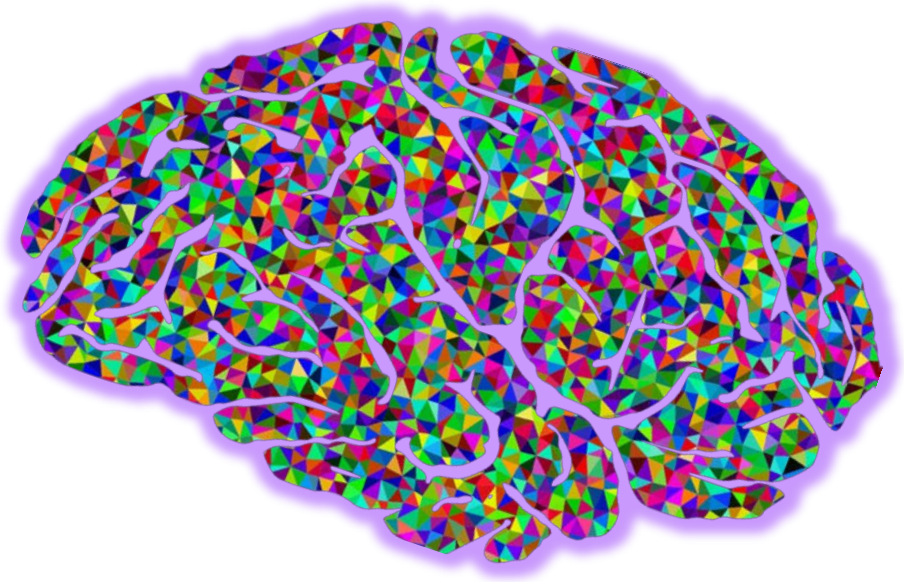
- ❖ Education Consultation
- ❖ Resource navigation
- ❖ Outreach and education
- ❖ Juvenile/criminal justice
- ❖ Self-management & skill building
- ❖ Classes and workshops
- ❖ Recreation and social programs
- ❖ And more – when in doubt, refer to us!
- ❖ ALL AGES CAN ACCESS THIS FREE SUPPORT!

BIAColorado.org

303-355-9969

Brain Injury Resources

- Center on the Developing Child – Harvard University https://developingchild.harvard.edu/
- Centers for Disease Control: https://www.cdc.gov/traumaticbraininjury
- Brainline Kids: http://www.brainline.org/landing_pages/features/blkids.html
- Other Authors & Trainers:
  - Dr. Laura Anthony - https://www.unstuckontarget.com
  - Dr. Peg Dawson and Dr. Richard Guare - https://www.smartbutscatteredkids.com
  - Dr. Ross Greene - https://drrossgreene.com
  - Sarah Ward - https://efpractice.com



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