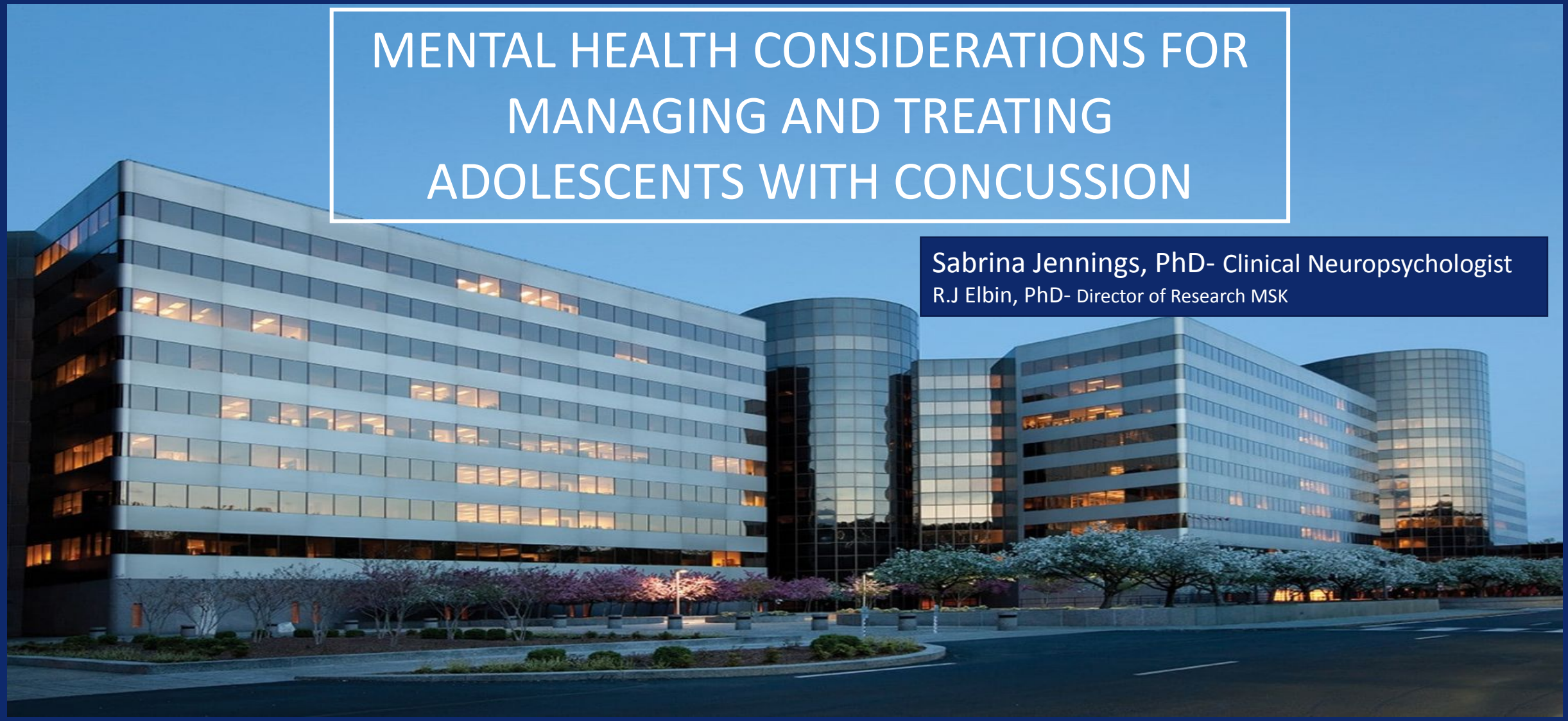
MENTAL HEALTH CONSIDERATIONS FOR MANAGING AND TREATING ADOLESCENTS WITH CONCUSSION



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Inova Concussion Program

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Disclosure Statement

- The statements and opinions contained in this program are solely those of the presenters. Treatment options and tools presented are some of many that are available.
- Presenter, Dr. Sabrina Jennings does not have any financial associations, or any conflicts of interest related to the topic/content of this presentation.

Learning Objectives

1. Identify signs of elevated mood in adolescents with concussion

2. Understand the interaction between elevated mood and other concussion clinical presentations

3. Support adherence for at-home treatment plans for post-concussion anxiety and depression in adolescents with concussion

Concussion 101

Epidemiology of Concussion

- Centers for Disease Control (CDC) estimates that **2 million** children and adolescents >18yrs old between 2010-2016 incurred a head injury (Sarmiento et al., 2019)
- **50-70%** of concussion go unreported among high school and collegiate athletes (Llewellyn et al., 2014; Rivara et. Al., 2014; McCrea, Hammeke, Olsen, Leo & Guskiewicz, 2004)
- As many as **19%** of athletes that participate in contact sport will experience a concussion (CDC, 2015)

Concussion Rates Among High School Athletes

Sport	Practice Rate*	Game Rate*	Total Rate*
Football	3.1	22.9	6.4
Boys' ice hockey	1.1	14.6	5.4
Boys' lacrosse	1.1	10.4	4.0
Girls' soccer	0.8	9.2	3.4
Girls' lacrosse	1.3	8.6	3.5
Girls' basketball	0.6	5.5	2.1
Boys' wrestling	1.3	4.8	2.2
Girls' field hockey	1.4	4.1	2.2
Boys' basketball	0.6	3.9	1.6
Girls' softball	0.9	1.6	1.6

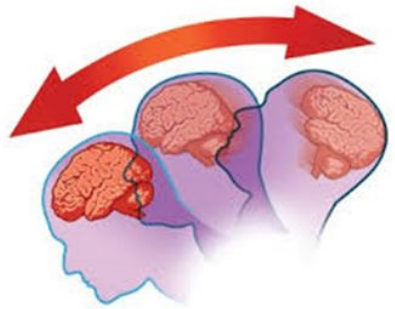
*Rate (per 10,000 athletic exposures)

Marar et al., 2012

Athletic exposure defined as in practice or game

What is a concussion?

- A concussion is a mild Traumatic Brain Injury (mTBI) caused by a blow to the head or violent shaking of the head/body.
- Disruption of brain function is related to **neurometabolic dysfunction** rather than structural brain injury
  - Typically associated with **normal** structural findings on imaging
- Results in a constellation of **physical, cognitive, emotional, and sleep-related** symptoms.
  - Symptoms may last from several minutes to days, weeks, months, or even longer in some cases.
- Mechanisms of injury (MOI) include:
  - Sports, motor vehicle accidents, physical assault, slips, falls and mundane accidents.



Diagnosing a Concussion

1. **Mechanism of Injury**
   - "may be caused by either a direct blow to the head, face, neck or elsewhere on the body, with an impulsive force transmitted to the head." 6th Consensus statement on Concussion
2. **Immediate Symptoms**
   - "Typically results in the Rapid onset of short-lived impairment of neurological function that resolves spontaneously" (McCrory et al., 2017)
   - "In some cases, signs and symptoms evolve over a number of minutes to hours" (McCrory et al., 2017)

Concussion Signs

Traditional Signs

- Loss of consciousness (LOC)
- Post-Traumatic Amnesia (PTA)
- Mild Confusion/Disorientation
- Motor Incoordination
- Balance Problems
- Slow to Get up
- Clutching Head

Danger Signs

- LOC > 30min
- Convulsion/Seizure Activity
- Repeated Vomiting
- Weakness/Numbness
- Severe or worsening headache
- Difficulty Staying Awake
- Slurred Speech
- Gross Disorientation/Confusion
- Unusual Behavior

PHYSICAL 	EMOTIONAL 	COGNITIVE 	SLEEP 
Headache Nausea/Vomiting Balance Problems Dizziness Visual Problems Light/Noise Sensitivity Tinnitus Fatigue	Irritability Sadness Feeling “on-edge” Nervousness Anxiety Rumination Depression	Feeling slowed down Mentally foggy Difficulty concentrating Difficulty remembering	Trouble falling/staying asleep Sleeping more/less than normal Drowsiness

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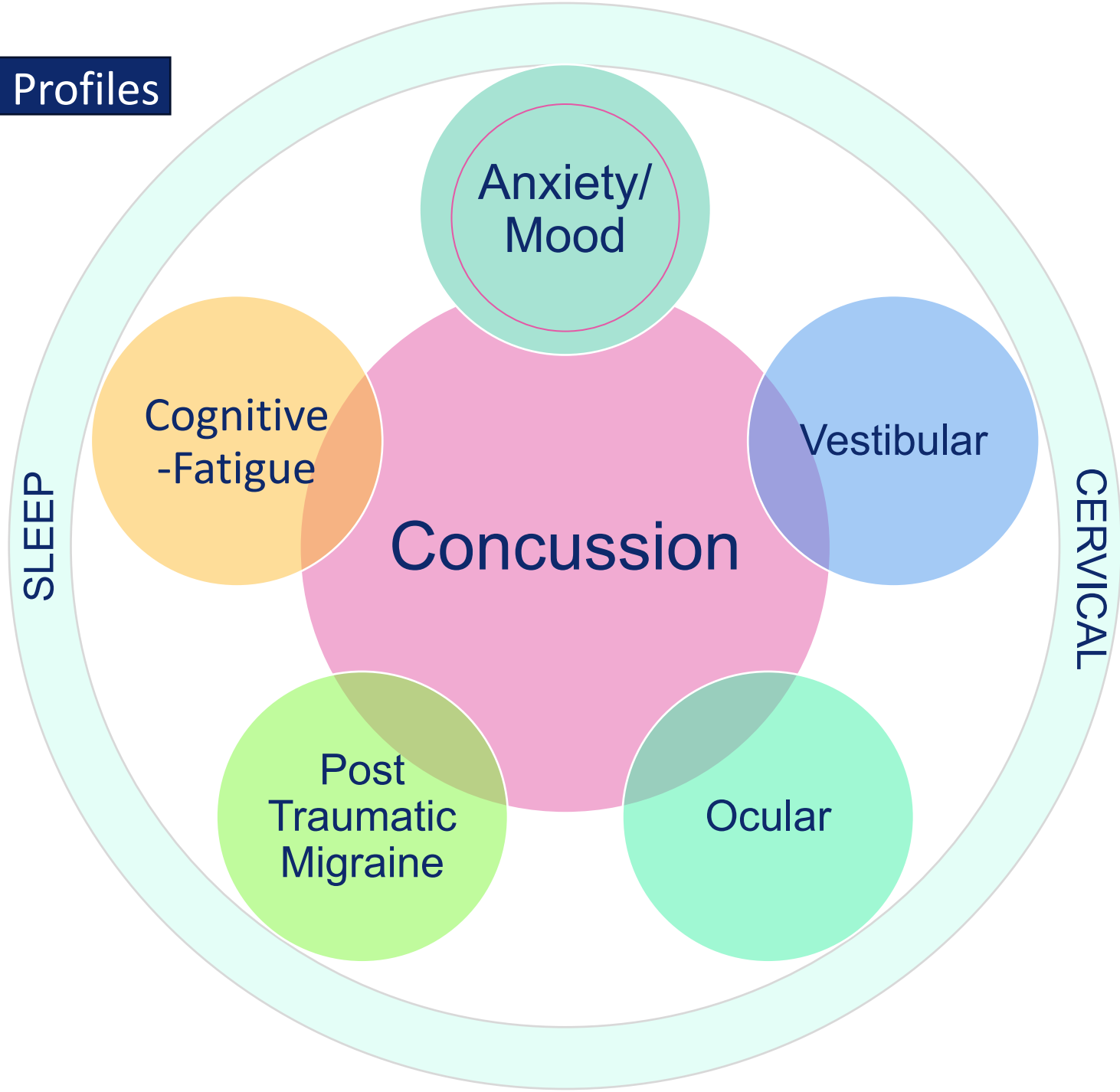
Emotional Symptoms & Concussion

Epidemiology of Mental Health Diagnoses in Adolescence

- Globally, **one in seven** 10-19-year-olds experiences a mental disorder, accounting for **13%** of the global burden of disease in this age group
- Depression, anxiety and behavioral disorders are among the **leading** causes of illness and disability among adolescents
- Suicide is the **fourth** leading cause of death among 15-29 year-olds.
- It is estimated that **3.6%** of 10–14-year-olds and **4.6%** of 15–19-year-olds experience an anxiety disorder.
- Depression is estimated to occur among **1.1%** of adolescents aged 10–14 years, and **2.8%** of 15–19-year-olds.

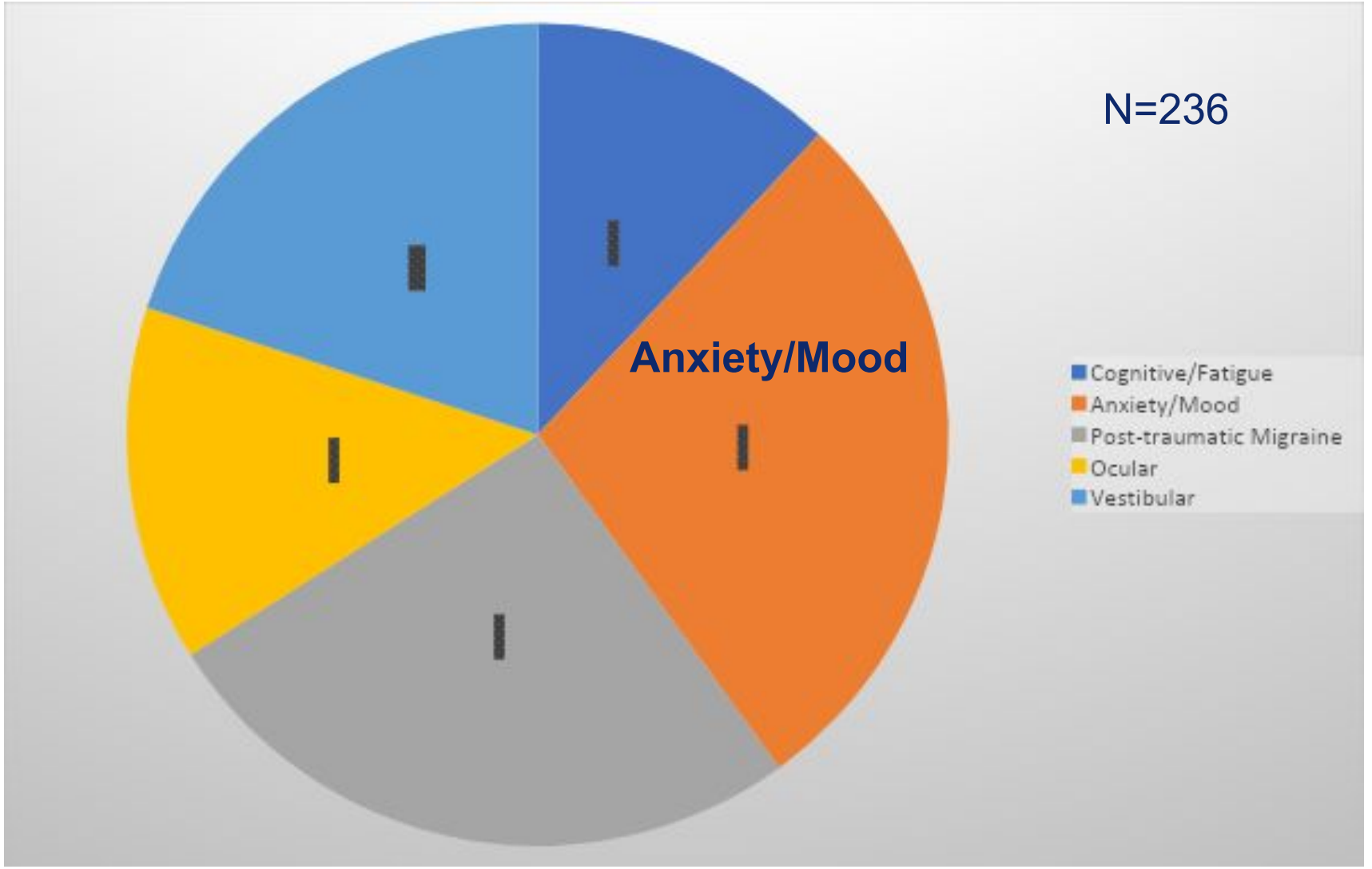
(1) Institute of health Metrics and Evaluation. Global Health Data Exchange (GHDx)
(2) WHO Global Health Estimates 2000-2019
(3) Global status report on alcohol and health 2018
(4) World Drug Report 2020
(5) 2019 Global Health Estimates (GHE), WHO, 2020

Concussion Clinical Profiles



Kontos et al., 2019

Which Primary Clinical Profile is Most Common?



Kontos et al., 2019

Assessing Emotional Symptoms After Concussion

PATIENT HEALTH QUESTIONNAIRE-9 (PHQ-9)

Over the last 2 weeks, how often have you been bothered by any of the following problems? *(Use "✓" to indicate your answer)*	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3

FOR OFFICE CODING 0 + _____ + _____ + _____

=Total Score: _____

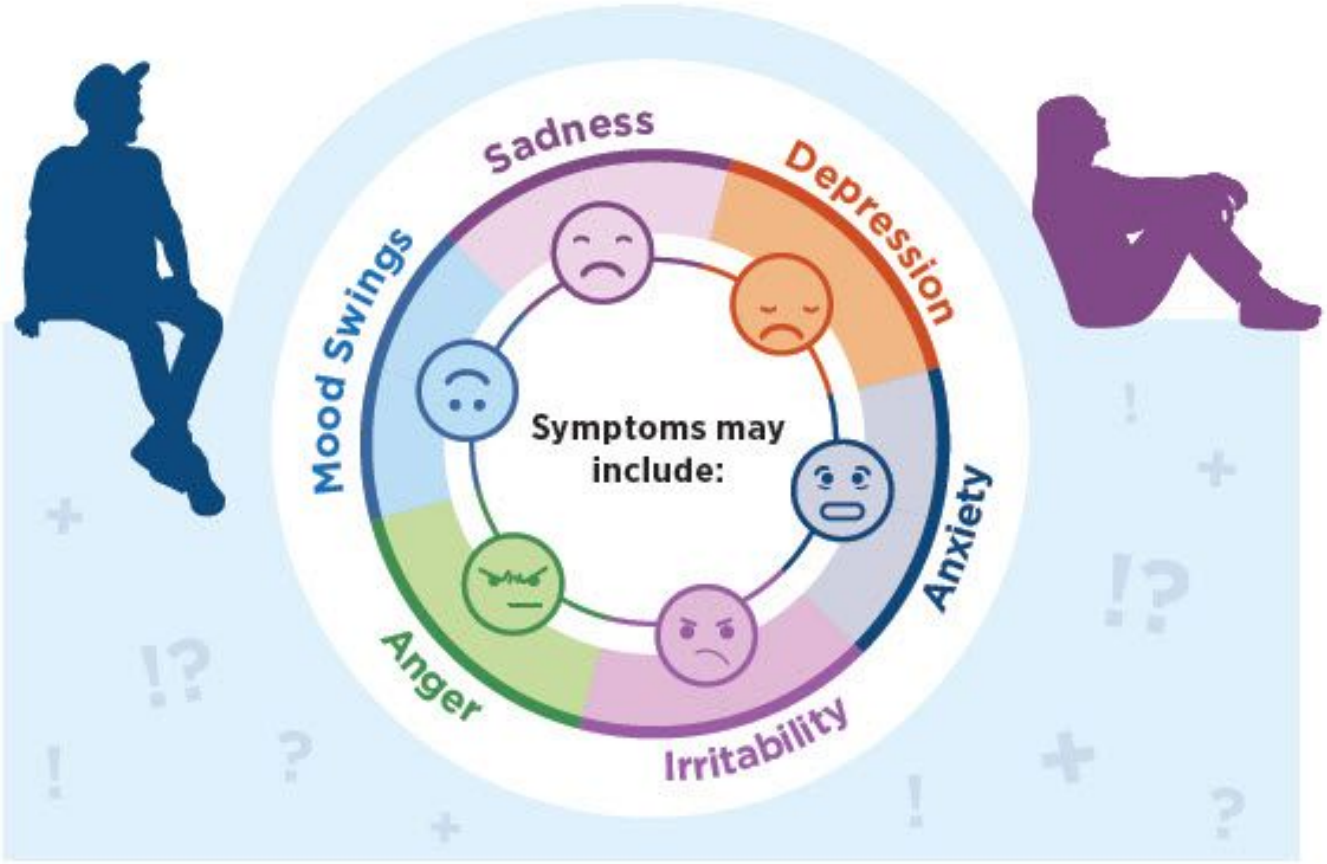
1. **Clinical Interview**
2. **Neurological/Neuromotor Screen**
3. **Neuropsychological Evaluation**
   - Cognitive Functioning
   - Emotional Functioning
4. **Self Report Inventories**
   - Post-Concussion Symptom Scale (PCSS)
   - Beck Depression Inventory
   - State Trait Anxiety Inventory
   - PHQ-9

Clinical Findings

- Excessive worry
- Difficulty turning thoughts off (i.e., rumination)
- Preoccupation with symptoms
- Sadness
- Withdrawal/limited social interaction
- Lost of interest
- Symptoms of panic
- Sleep dysregulation
- Exaggerated or inconsistent somatic symptoms

Kontos et al., 2019

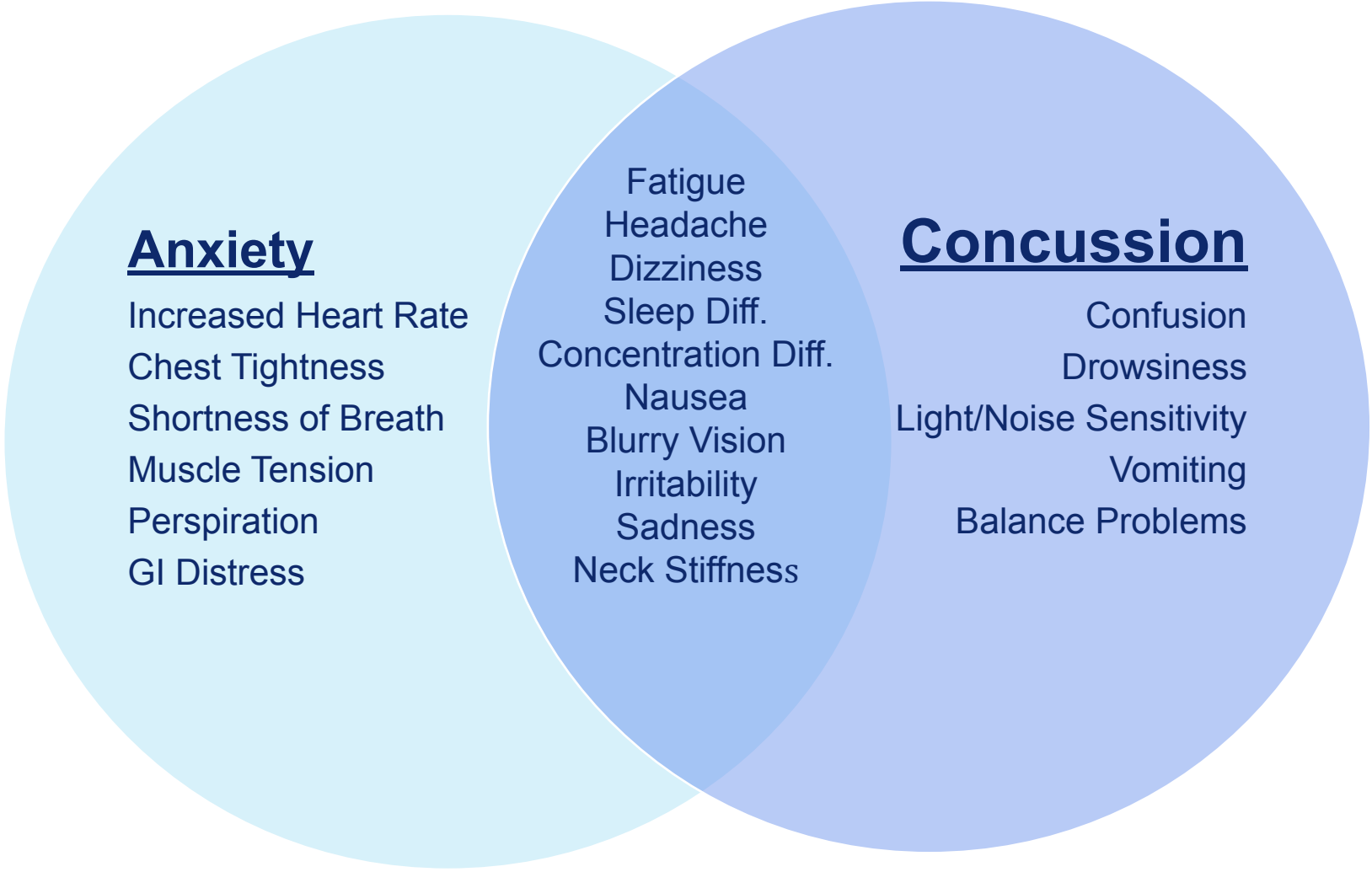
Risk Factors



- Personal and/or family history of psychiatric issues
- Psychiatric/mood medication history
- Comorbid migraine
- Presence of significant life stressor
- Biological Female Sex

Kontos et al., 2019

SYMPTOM OVERLAP



Things To Consider as a Parent, Coach, ATC or Provider

- Concussion can change the athlete's social roles, sense of self/identify and self-esteem
- Affects relationships with friends, parents, coaches, teachers, & community
- May create difficulty in responding to new situations
- Emotional reactions may occur to the trauma of amnesia, or loss of consciousness, as well as to being significantly impaired or unable to perform
- Emotional or behavioral symptoms may be the direct result of the concussion OR a result of adjustment to the injured status

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Treatment of Anxiety/Mood Clinical Profile

Parent, Teachers, Coaches:

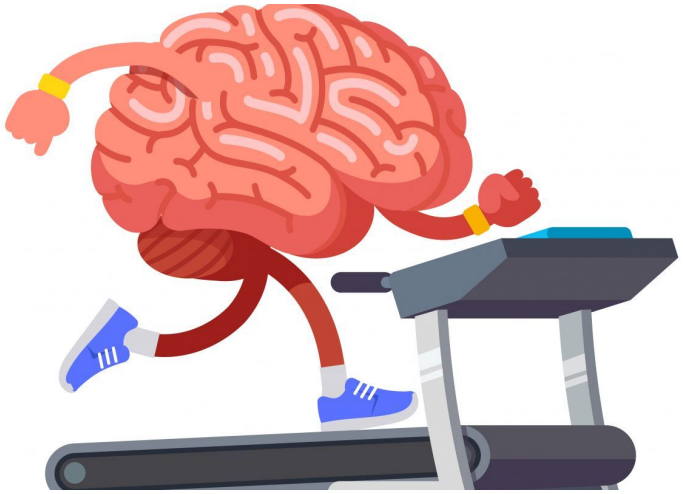
EMOTIONAL RESPONSE TO INJURY SHOULD BE REGULARLY MONITORED

LISTEN TO STUDENT, NORMALIZE FEELINGS, DON'T BE DISMISSIVE

HELP STUDENT IDENTIFY SUPPORT SYSTEM

Healthcare Provider, ATC, Nurses:

- **Psychoeducation**: What signs and symptoms to expect after concussion in a positive framework (Ponsford et al., 2001)
- **Behavioral Regulation**: Implementing Behavioral Regulation after 48hrs of rest has been proven useful in mitigating symptoms (Womble & Collins, 2016)
- **Desensitization**: The adaptation of an exposure-recovery model or "systematic desensitization" has helped to decrease symptoms
- **Psychotherapy:**
  - Cognitive Behavioral Therapy (CBT)
  - Mindfulness Practice
  - Coping Strategies
  - Psychopharmacologic Interventions



Provide Reassurance

- Students need to know that they will get **better,** and their injury is treatable.
  - The media has created hysteria surrounding concussion.

- **Important Components:**
- Setting **expectations** regarding course of symptoms and recovery time
- Helping students **understand** the role of pre-existing risk factors in prolonged recoveries
- Helping students **understand** that recommendations for treatment have changed significantly in the last 5 years from a rest to active-based treatment approach
- **Recognize** the disruptive nature that concussion symptoms may cause for an individual their family and the potential that adding additional restrictions that may not be necessary could create further emotional stress during recovery

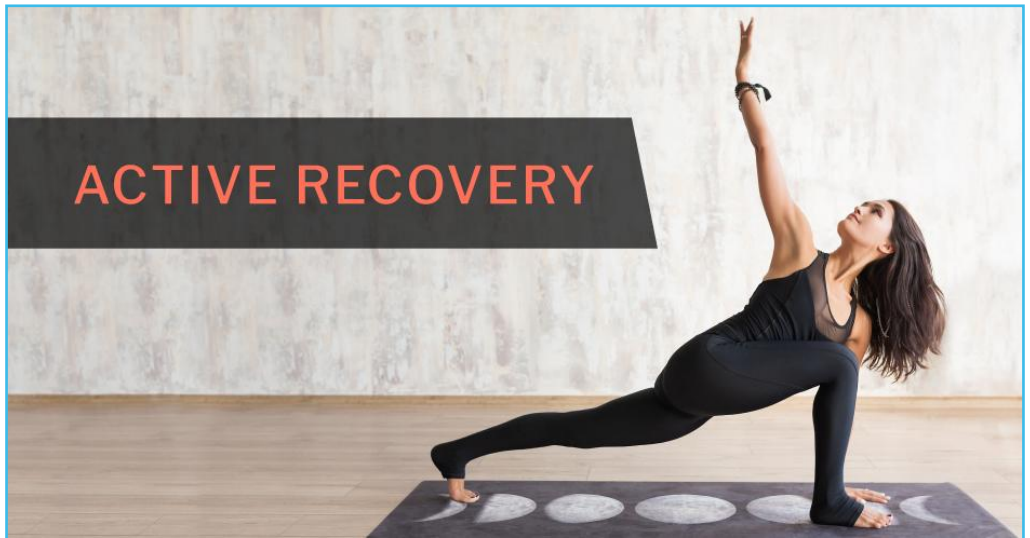
Strict Rest is NOT the Best!

- *There is currently insufficient evidence that prescribing complete rest achieves these objectives. After a brief period of rest during the acute phase (24-48 hours) after injury, patients can be encouraged to become gradually and progressively more active while staying below their cognitive and physical symptom-exacerbation thresholds (ie, activity level should not bring on or worsen their symptoms). It is reasonable for athletes to avoid vigorous exertion while they are recovering. The exact amount and duration of rest is not yet well defined in the literature and requires further study.*

McCrory et al. (2017) *BJSM*, p. 5; Thomas et al. (2015) *Pediatrics*

Rest May Have Negative Effects

- Mood worsened through removal from routines, social isolation, missed school/sport (Olsson et al., 2013; Ponsfort et al., 2012)
- Discharge instructions for rest = higher symptom burden (Zuckerbraun et al., 2014)
  - Contextual Framing Effect
- Rest leads to hypervigilance and focus on symptoms (Heath, 2013)



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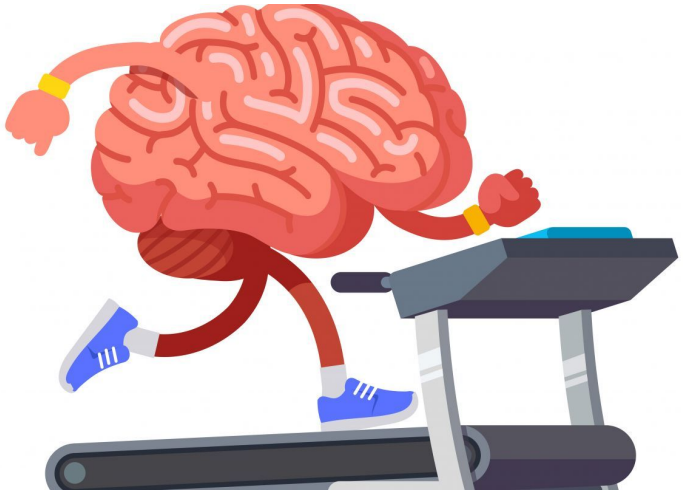
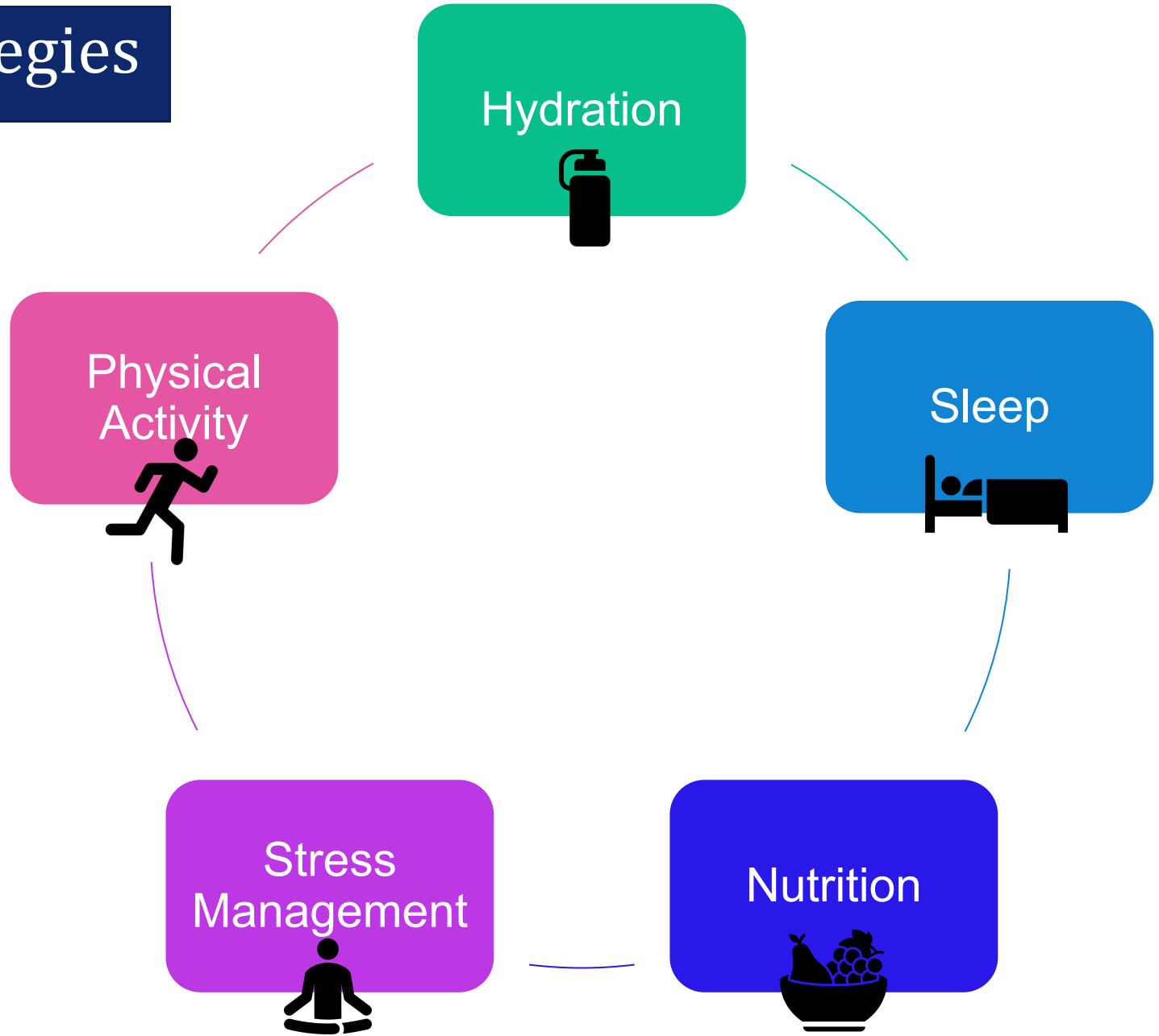


Behavioral Regulation Strategies

Clinical Observation:

We believe that behavioral regulation strategies are a foundation of good concussion management.

Patients that have this under control seem to experience less anxiety/mood issues during their recovery



Behavioral Regulation is Associated With Decreased Post-Concussion State Anxiety and Depression

Kori J. Durfee[1], Sabrina Jennings[2], Melissa N. Womble[2], Stephanie Amalfe[2], Christina M. Dollar[2], Philip Schatz[3], Anthony P. Kontos[4], Michael W. Collins[4], R.J. Elbin[1]

[1]University of Arkansas, Fayetteville, AR; [2]Inova Sports Medicine Concussion Program, Fairfax, VA; Saint Joseph's University, Philadelphia, PA; [4]University of Pittsburgh Medical Center, Pittsburgh, PA

Purpose:

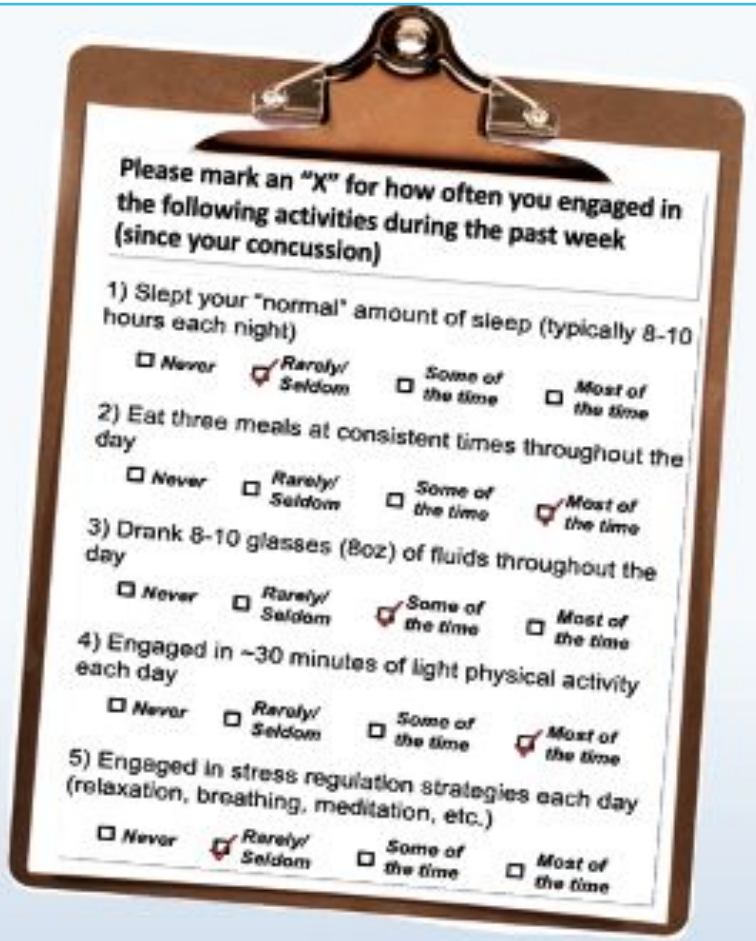
- To examine the effects of self-reported behavioral regulation on post-concussion anxiety and depression in individuals with sport-related concussion (SRC).

Methods:

- *Design and Participants* – A retrospective chart review of 132 patients (*M*=16.42, *SD*=1.95 yrs, 45% female) seeking care for concussion within 1-7 days (*M*=3.85).

- *Measures and Procedures* – All participants completed a 4-point Likert scale indicating their frequency of behavioral regulation in the domains of sleep, nutrition, hydration, physical activity, and stress management (See Figure 1) at their first clinical visit. The State-Trait Anxiety (STAI) and the Patient Health Questionnaire (PHQ-9) was also administered.

- *Data Analysis* – Scores on the behavioral regulation questionnaire were grouped into HIGH (Most of the Time) and LOW (Some of the Time – Never) for each domain. Groups were compared on state anxiety and depression scores, and any between-group differences on risk factors (e.g., gender, symptom burden, migraine history, etc…) were controlled for in all analyses.



RESULTS:

- State anxiety scores were significantly **LOWER** for the HIGH behavioral regulation in Sleep (F (1, 129) = 4.67, p=.03), PA (F (1, 128) = 8.88, p=.003), and Stress (t (130) = 1.89, p=.03) domains than the LOW groups (Figure 1).
- Depression scores were significantly **LOWER** for the HIGH behavioral regulation in Sleep (F (1, 129) = 8.70, p=.004), Diet (F (1, 125) = 10.22, p=.002), and PA (F (1, 128) = 5.09, p=.03) domains than the LOW groups (Figure 2).

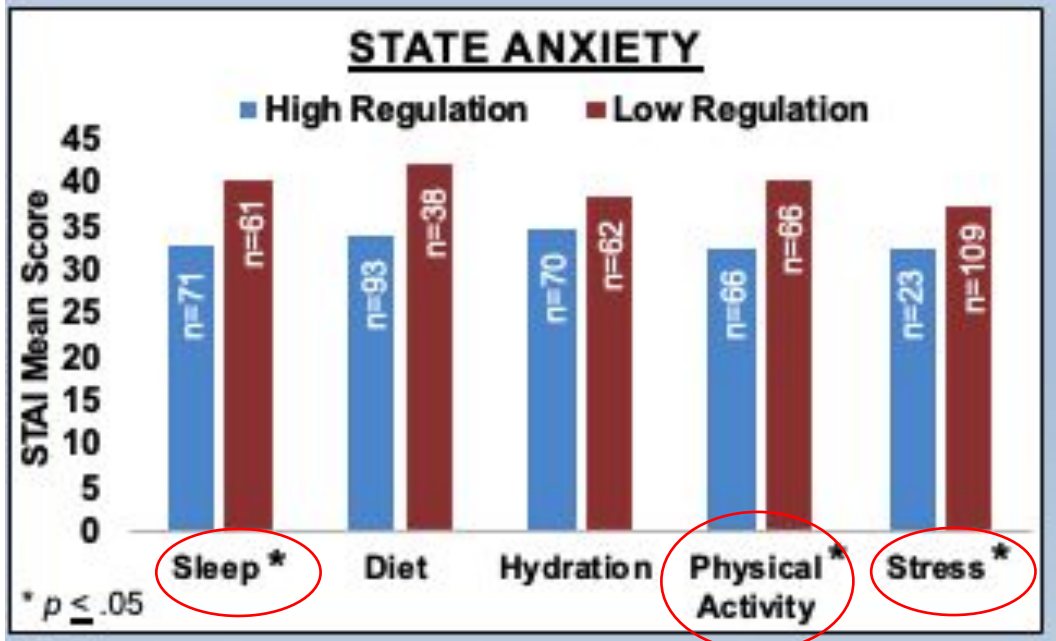


Figure 1. STAI Mean Scores for High and Low Behavioral Regulation Groups (N=132)

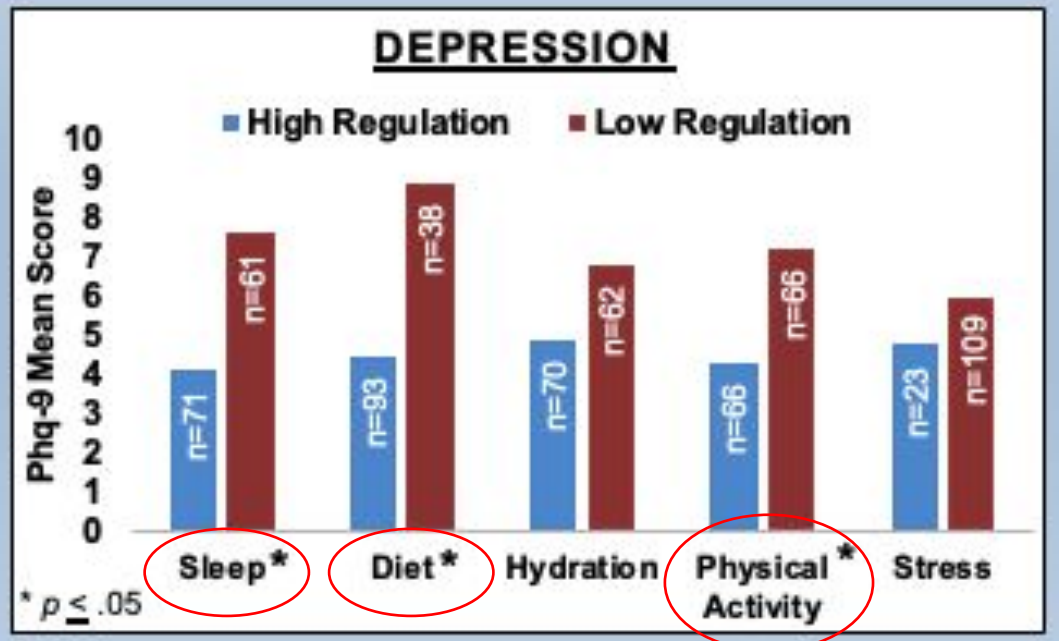


Figure 2. PHQ-9 Mean Scores for High and Low Behavioral Regulation Groups (N=132)

- These results align with previous literature showing a negative relationship between physical activity and anxiety and depression levels, and increased state anxiety in individual with sleep deprivation.
- Behavioral regulation is a low-cost, non-pharmacological strategy that should be the first step for the management of concussion

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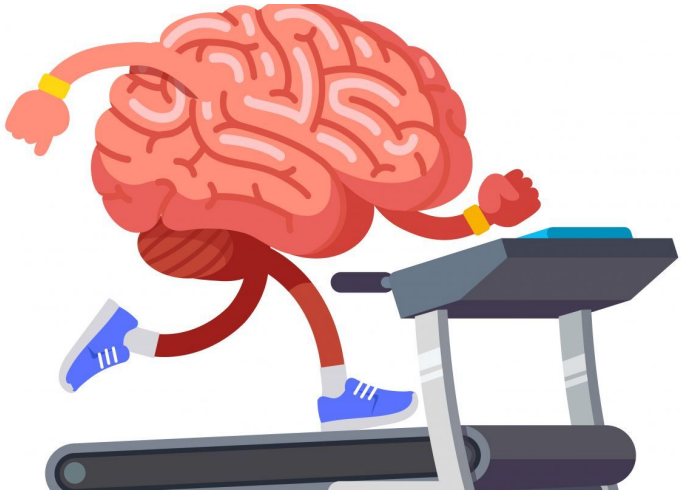
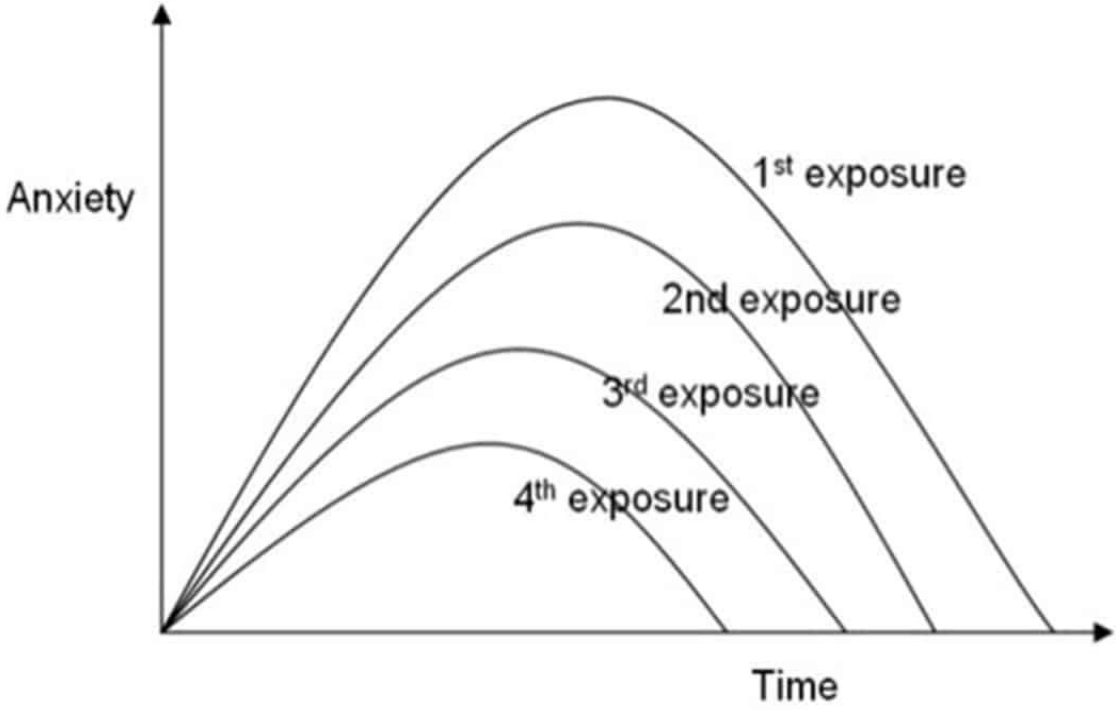


Desensitization to Overcome Anxiety

- Avoidance and rumination strategies may reduce anxiety temporarily, but it maintains it over time. Encourage active coping on a day-to-day basis

- Exposure to fear-eliciting stimuli or situations
- Prevention of avoidant behaviors
- Foster adaptive coping and processing of new learning/corrective information
- Gradual habituation to symptoms over time, repeated trials



Case Example

15-yr-old Female Ice Hockey Player

- While skating off the ice was hit in the back causing her to fall forward and hit the front of her head on the ice.
- No LOC, PTA, confusion or disorientation.
- Evaluated by ATC and pulled from the game.
- While sitting on the bench started to feel as if her legs were shaking and weak.
- The following morning experienced weakness in both legs, slurred speech and disorientation.

15-yr-old Female Ice Hockey Player

- **Immediate Treatment/Evaluation:**
  - Emergency Department: all imaging was negative, follow with PCP and Concussion Clinic
  - PCP: rest-based approach
- **Pre-existing risk factors:** Personal history of anxiety. Family history of migraines.
- **Symptoms upon initial presentation:** walked in with crutches noting difficulty walking; and feeling off-balanced. Significant stutter/slurred speech, *headache* (constant); light/noise sensitivity, environmental sensitivity, *trouble concentrating*, *difficulty falling and staying asleep*, memory challenges, *irritability and blurred vision*
- **Other information:** Straight A student in AP/IB classes

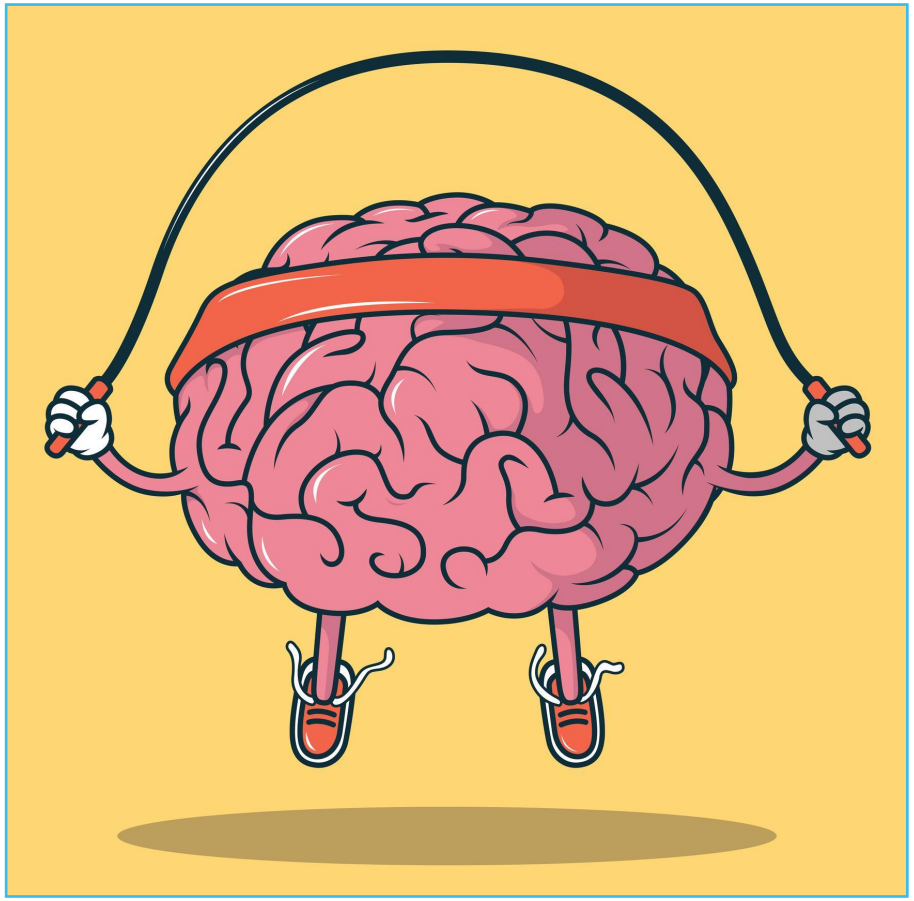
Other Collected Data:

STAI = 49 (clinically significant)

PHQ9 = 7 (mild depression)

Treatment Plan

- **Psychoeducation:** Reframing the injury and setting expectations
- **Behavioral Management Strategies**
  - Progress through with return-to-play for Ice Hockey
  - Progress with a return-to-school plan with accommodations
- **Relaxation/Stress Management**



Thank You!

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