



# TBI-BH ECHO

Traumatic Brain Injury – Behavioral Health ECHO  
UW Medicine | Psychiatry and Behavioral Sciences

# Persistent symptoms after TBI

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# Speaker disclosures

✓ Kayli Gimarc, Natasha Mehta, and Cherry Junn have no conflicts of interest to declare

# Objectives

1. Discuss etiology and risk factors for persistent symptoms
2. Learn about most common persistent symptoms
3. Discuss management of persistent symptoms

# Lecture outline

This lecture will focus on mild TBI.

1. Initial management of TBI
2. Risk factors for persistent symptoms
3. Etiology of persistent symptoms
4. Diagnosis/assessment of persistent symptoms
5. Persistent symptoms
  - A. Cognitive symptoms
  - B. Affective symptoms
    - Depression

- Emotional dysregulation

## C. Somatic symptoms

- Headache
- Sleep disturbance
- Fatigue
- Dizziness / vestibular dysfunction
- Visual dysfunction

## 6. Management of persistent symptoms

Terminology note:

In this lecture we will use “concussion” and “mild TBI” interchangeably.

mTBI = mild traumatic brain injury

CBT = cognitive behavioral therapy

DoD = Department of Defense

# Initial management of TBI:

- Brief period of relative rest during acute phase (24-48 hours)
- Evaluation of signs/symptoms
- Education/counseling
  - Anticipated positive trajectory of recovery
  - Normalization of symptoms
  - Education about symptoms and recommended treatment
  - Avoidance of further head injury during initial recovery
- Screen for depression/anxiety
- Gradual and progressive resumption of physical and cognitive activity
  - "Sub-symptom threshold"

# Persistent symptoms:

- Some individuals report persistent symptoms for months or years
- Several prospective studies have noted that symptom reporting after mTBI is relatively stable from 3 mo-1 year
- Symptoms may be waxing/waning over time
- Persistent symptoms associated with high levels of healthcare utilization
- Patients with persistent symptoms 3 months post injury should be referred for specialist management if available

# Risk factors for persistent symptoms:

- Pre-injury factors

## Pre-existing mental health condition

- Depression
- Anxiety
- PTSD

## Substance use

## Prior brain injury

## Prior medical/neurologic conditions

- Migraines
- Chronic pain
- ADHD
- Learning disability



# Risk factors for persistent symptoms:

- Post-injury factors

## Psychological and social factors

- “Good old days” bias
- Lack of social supports
- Misattribution
- Negative expectations for recovery

## Contextual factors

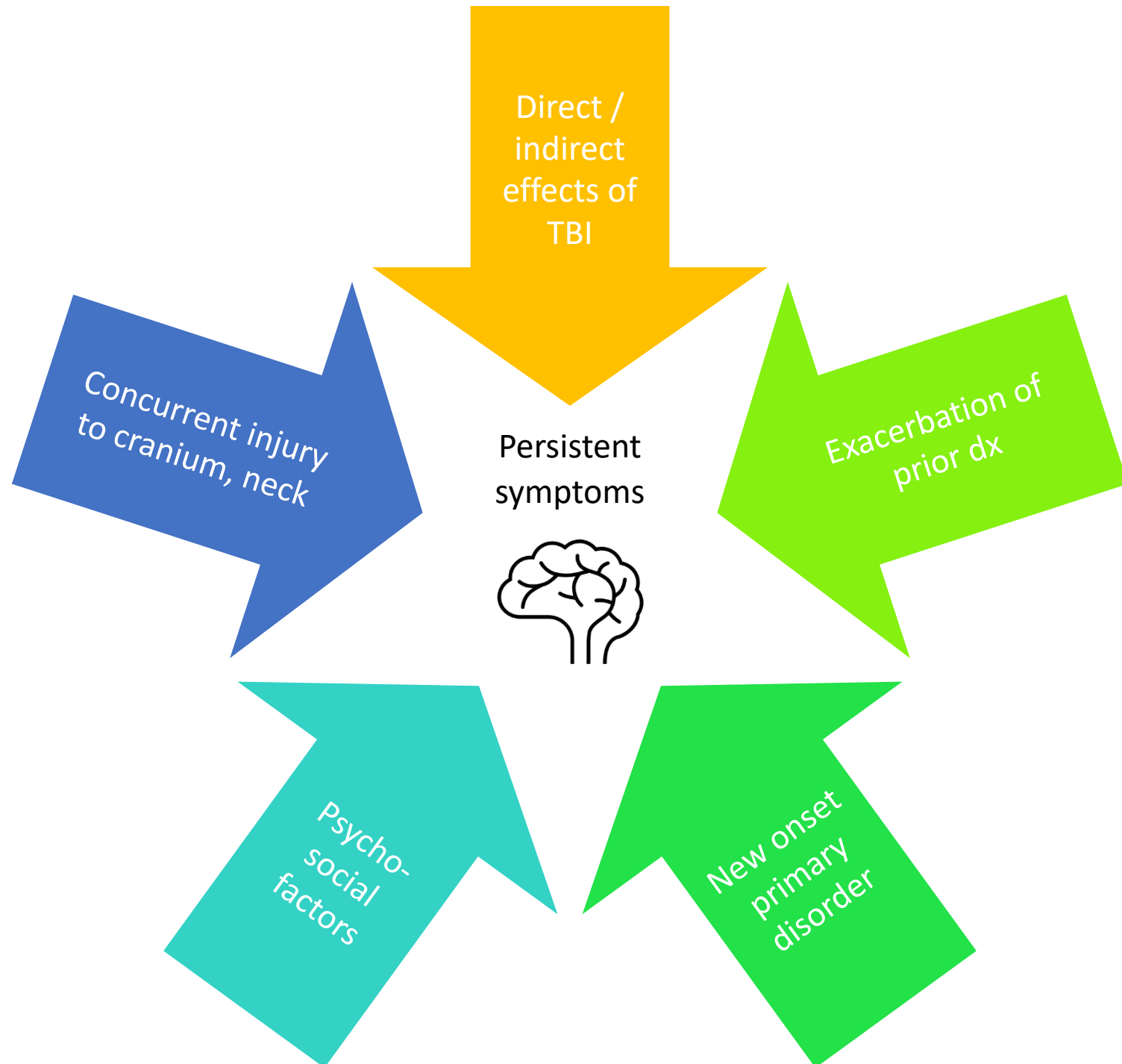
- Litigation
- Lifestyle and family dynamics change
- Trauma/distress of event
- Loss of vocation/avocation

# Etiology of persistent symptoms

- When are symptoms “persistent”?
- What about post-concussive syndrome?
- It is likely that no single underlying disease mechanism for post-concussion syndrome exists
  - This terminology attributes persistent symptoms directly to injury itself (single underlying cause), when multiple factors likely at play for most individuals
  - Thus, this phrase is being phased out of use
  - Suggested terminology: persistent or prolonged symptoms after TBI
    - → acknowledges that while the TBI can be the inciting event, multiple factors are likely at play

# Etiology of persistent symptoms

- Disentangling symptom etiology is challenging
  - Post-concussion symptoms are non-specific
  - Similar symptoms are common to chronic pain, depression, sleep disorders, trouble concentrating, irritability
  - These symptoms are also common in the general population
- Multidimensional cumulative stressor model
- Consider the timeline
  - Temporal relationship between injury and symptom onset
  - For new symptoms that develop >30 days after mTBI, DoD suggests symptom specific evaluation for non-mTBI etiologies



# Assessment of persistent symptoms:

- Provider role: comprehensive assessment
  - Reassess symptom severity and impact on function
  - Directed physical exam
  - Evaluate for complicating health-related and contextual factors
    - Support system
    - Mental health history
    - Co-occurring conditions
      - Chronic pain
      - Mood disorders
      - Stress disorder
      - Sleep disorders
    - Substance use
    - Unemployment or change in job status
    - Suicide risk
  - Education and reassurance
  - Initiate targeted treatment of specific symptoms

# Types of persistent symptoms:

## Cognitive

- Memory
- Attention
- Processing speed
- Judgment
- Speech and language

## Affective

- Depression
- Anxiety
- PTSD
- Irritability
- Aggression

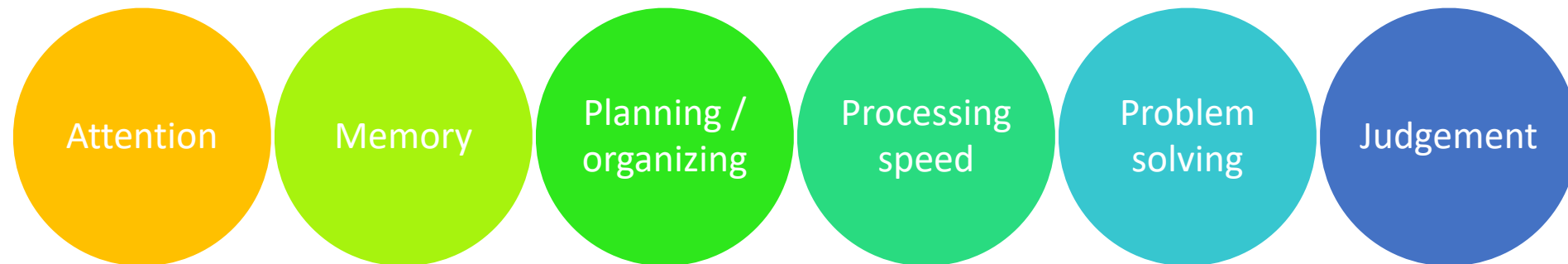
## Somatic

- Headache
- Dizziness
- Fatigue
- Sleep disturbance
- Visual disturbance



# Cognitive

- mTBI can be associated with difficulties in multiple cognitive domains
- Expected recovery ranges from 1 week to 6 mo in general
  - 15-33% of people experience persistent cognitive symptoms
- Significant influence from other factors: pain, meds, sleep disturbance, mood disorder, cognitive reserve
- Symptoms do not typically worsen over time as direct result of traumatic injury



# Cognitive

- Evaluation
  - Clinical screening (MoCA, SCAT5)
  - Neuropsychological testing (>3 mo)
  - Speech therapy
- Treatment
  - Early education associated with reduction in persistence and misattribution of symptoms
  - Speech therapy
    - Encourage support system to attend therapy sessions
  - Pacing strategies
    - Single task focus
    - Limit over-stimulation
    - Increase time for new learning
  - Compensatory strategies
    - Create daily structure
    - Memory aids (calendar reminders, pillbox, written instructions)
    - Engage trusted family/friends when solving problems



# Affective: Depression

- Large effect on post-concussion symptom reporting – significant overlap in symptoms common to both diagnoses
- ~1/2 of people with TBI are affected with depression the first year after injury; ~2/3 within 7 years of injury
- Frequently co-occurs with anxiety or PTSD
- Evaluation
  - Screen for suicide risk
  - Symptom evaluation
    - PHQ-9 (depression), GAD-7 (anxiety)
- Treatment
  - Pharmacologic: SSRI or SNRI is generally first line
    - Maintenance at least 6-9mo recommended
  - Psychotherapy (CBT, behavioral activation therapy)

# Affective: Emotional dysregulation

- Emotional lability and mood swings
- Can be exacerbated by lowered frustration tolerance, chronic pain, difficulty self-monitoring
- Typically improves in first few months
- Treatment
  - Family counseling: reduce stress and irritability triggers; set some rules for communication; develop behavioral outlets
  - Consider support groups and peer mentoring
  - Psychotherapy
  - Pharmacologic treatment: mood stabilizers

# Somatic: Headache

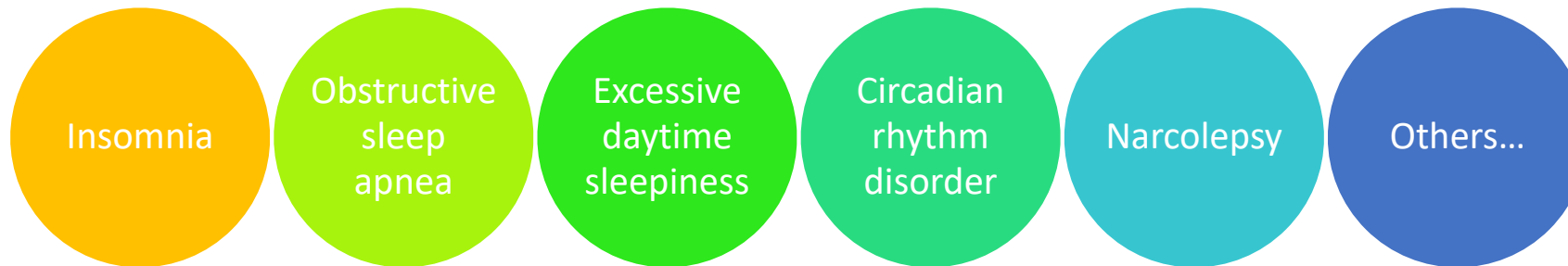
- Among the most common symptoms after TBI of any severity
- Several studies report more common after mild TBI > moderate/severe TBI
- Diagnosis
  - Determine clinical characteristics of primary headache type
    - Migraine
    - Tension-type
    - Cervicogenic
    - Medication overuse (rebound)
  - Evaluate current medications (including PRNs)
  - Neurologic and musculoskeletal exam
    - Include neck, shoulders, scalp, TMJ, vestibular
  - Co-occurring conditions (sleep disturbance, mood disorder) may contribute
  - Consider Headache Diary

# Somatic: headache

- Treatment – to be covered in depth in later lectures
  - Lifestyle strategies
    - Stretching, self-massage
    - Sleep hygiene
    - Stress management
    - Exercise
    - Habits/Substance use
  - Consider intermittent passive therapies (biofeedback, massage)
  - Targeted treatment of mood and sleep disorders
  - Medications
    - Guidelines based on primary headache type
    - Prophylactic: >15 headache days/month
    - Sparing use of Tylenol, ibuprofen

# Somatic: sleep disorders

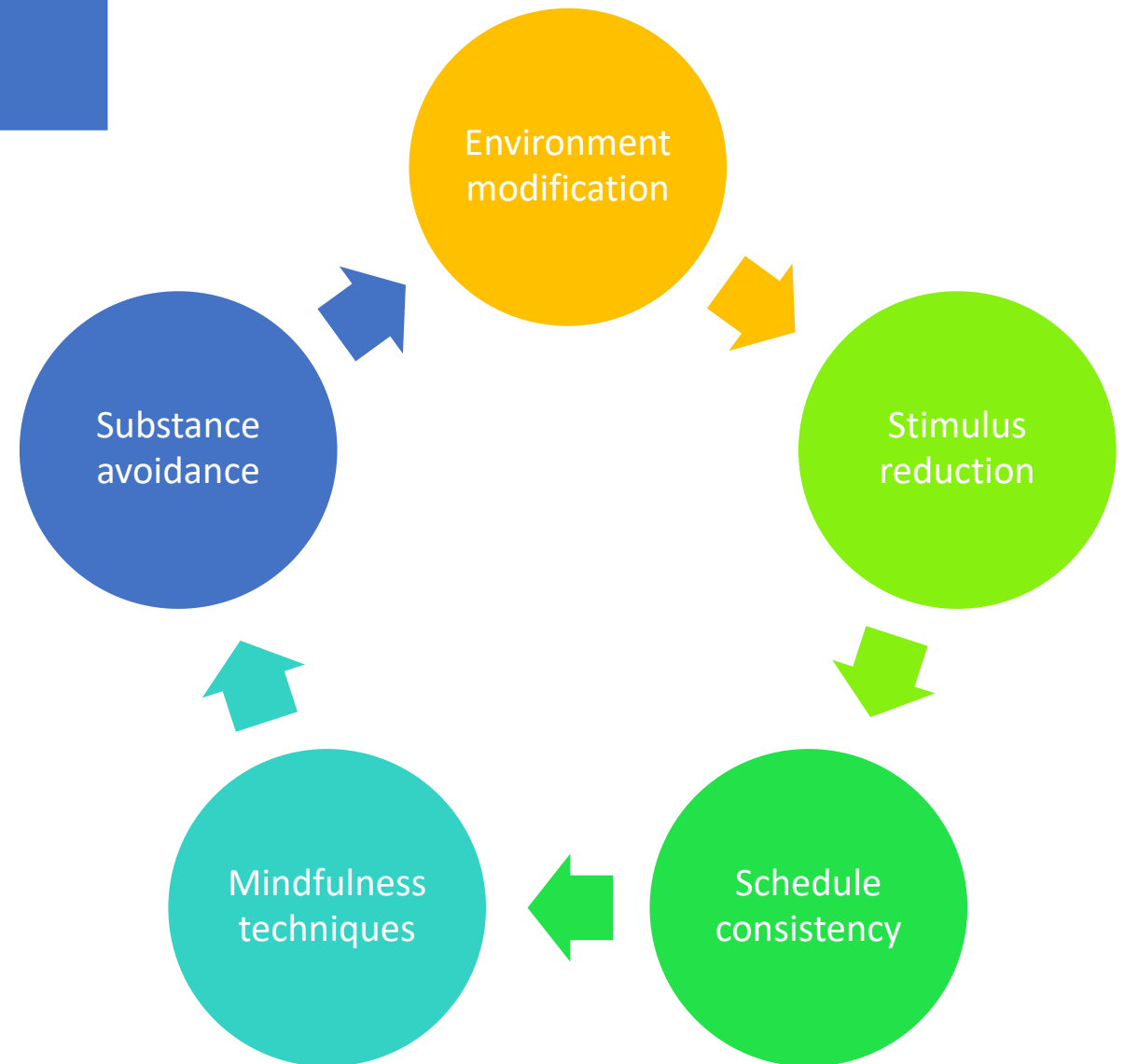
- 3x more common in individuals with TBI
- Sleep disturbance is a prognostic factor for functional and social outcomes at one year
- Poor sleep can worsen cognition (memory/attention), processing speed, mood, fatigue, pain
- Can be secondary to other conditions (depression, anxiety, pain)
- Common sleep disorders after TBI



- **Diagnosis**
  - Screening history
  - PSG if suspicion for sleep-related breathing disorder, nocturnal seizures, narcolepsy

# Somatic: sleep disorders

- Treatment can help with mood, pain, fatigue, cognitive problems
- Behavioral interventions (sleep hygiene) → first line
- CBT is treatment of choice for insomnia
- Medications
  - Consider melatonin
  - Antidepressants with sedating properties for co-occurring mood disorder (trazodone, nortriptyline, mirtazapine)
  - Avoid benzodiazepines
- Caution with over-the-counter sleep aids
  - Most contain antihistamine (diphenhydramine) – tend to avoid after TBI (cognitive disturbance, dizziness, increased risk of falls)



# Somatic: fatigue

- ~1/3 of individuals with persistent fatigue at 3 months after mTBI
- Conditions known to cause or increase fatigue:
  - Depression
  - Sleep problems
  - Headaches
- Diagnosis
  - Self assessment scales: Multi-dimensional Assessment of Fatigue (MAF), Fatigue Impact Scale (FIS), Fatigue Assessment Instrument (FAI)
  - Lab workup for other conditions (hypothyroidism, anemia, low vitamin D)
  - Review medications and timing
- Treatment
  - More research is needed
  - Treat co-occurring conditions
  - Track activities to determine triggers
  - Pacing strategies (cognitive and physical)
  - Non pharmacologic strategies: exercise, mindfulness techniques, CBT

# Somatic: vestibular dysfunction

- Vestibular system detects and interprets movement of the head, assisting with eye movements and postural control
  - Disruption in vestibular pathway = conflicting sensory inputs
- Peripheral and central vestibular disorders
  - Benign paroxysmal positional vertigo (most common)
- Other causes of dizziness: migraines, autonomic dysfunction, medications, depression, cervical
- Assessment
  - Characterization is important: vertigo, lightheadedness, syncope, disequilibrium
  - History: provoking activities, timing, medication review
  - Dix-Hallpike and supine roll tests to assess for BPPV
  - Balance testing (Balance Error Scoring System)
  - Vestibulo-ocular reflex (VOR)



# Somatic: vestibular dysfunction

- Treatment
  - BPPV: canalith repositioning maneuvers (Epley)
  - Vestibular suppressants can delay central compensation; current evidence does not support use
    - If symptoms significantly limit functional activities, can consider short trial
      - Meclizine > scopolamine
  - Vestibular rehabilitation
    - Promotes central compensation, improves functional balance and mobility
    - Strong emphasis on education
    - Habituation exercises: desensitize symptoms of motion provoked dizziness
    - Efficacy has been shown in non-TBI populations
    - Effective for unilateral peripheral vestibular dysfunction
    - Some evidence suggests may be helpful in central vestibular dysfunction

# Somatic: visual dysfunction

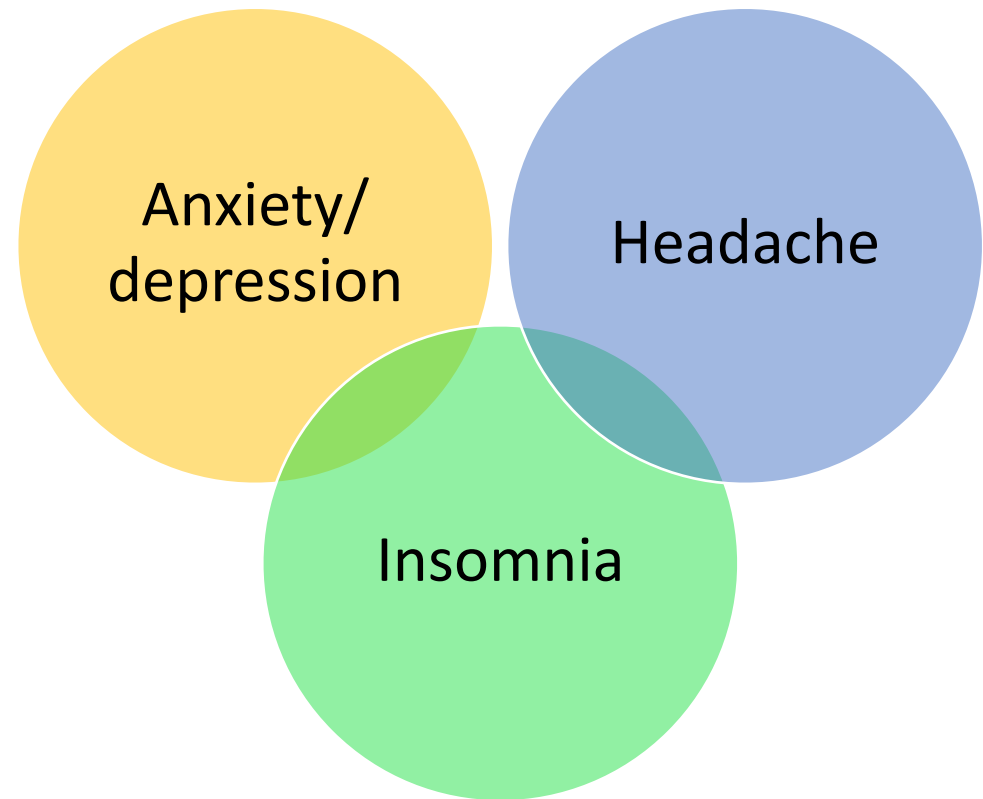
- mTBI can result in impairment of visual acuity, accommodation, vergence, visual field integrity
- Symptoms: Light sensitivity, eye fatigue, difficulty focusing, blurry vision, double vision
- Diagnosis
  - Detailed medication review (antihistamines, anticholinergics, digitalis derivatives)
  - Contributing factors: migraines, sleep disturbance, mood disorder
  - Referral to neuro-ophthalmology
- Treatment
  - Vision therapy – mixed results but can be beneficial in some patients (typically not covered by insurance)
  - Prism glasses – double vision
  - Tinted lenses – photosensitivity (blue light blocking; FL-41 rose tinted block both blue and green light)

# Management of persistent symptoms:

- Multimodal and multidisciplinary, depending on symptoms
- Early education
  - Normalization of symptoms
  - Expectation of further recovery
  - Guidance on return to activity
- Return to activity
  - Prolonged rest (>48 hours) is not shown to be helpful and is potentially harmful
- Symptom based management
  - Relies on extrapolated evidence involving other clinical populations
  - Where to begin, when many symptoms are present?

- Ontario Neurotrauma Foundation (ONF) recommends prioritizing:

- If these are treated, can bring about improvement in other symptoms (fatigue, difficulty concentrating, irritability)



# Management of persistent symptoms:

- Aerobic exercise
  - Generally safe post-concussion, "sub-symptom threshold"
  - Associated with faster symptom resolution
  - May reduce post-concussion symptom severity
- Psychological intervention
  - Cognitive behavioral therapy
  - Acceptance/commitment therapy
  - May have significant effect on functional outcomes
- Pharmaceuticals
  - Few pharmaceutical trials for mTBI
  - Studies have looked at guanfacine, bromocriptine
  - Symptom-based targeted pharmaceutical treatment



# Management of persistent symptoms:

- Interventions with insufficient evidence (VA/DoD)
  - Acupuncture
  - Tai chi
  - Meditation
  - Yoga
  - Massage
  - Chiropractic therapy
- Interventions not recommended (VA/DoD)
  - Absolute rest >48 hours
  - Hyperbaric oxygen
    - Literature does not support efficacy
  - Repetitive transcranial magnetic stimulation (rTMS)

# Summary:

## Initial management

- Education, counseling is key
- Complete rest >48 hours is not recommended
- Gradual resumption of cognitive and physical activity is recommended

## Risk factors for persistent symptoms

- Pre-injury factors
- Post-injury factors

## Evaluation of persistent symptoms

- Etiology is generally multifactorial
- Co-occurring conditions are common

## Most common persistent symptoms

- Cognitive symptoms
- Affective symptoms
- Somatic symptoms

## Management of persistent symptoms

- Targeted, symptom based treatment
- Prioritize mood disorder, headache, sleep
- Aerobic exercise is recommended
- Psychological intervention can be helpful
- Continued counseling and education



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# Questions?





# References

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