



*Persisting Problems with Attention, Speed of Processing,
Memory and Executive Functions* *LIUNA 02/10/26*

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FACULTY/PRESENTER DISCLOSURE

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Overview

1. Attention, speed of processing, memory, executive function
2. What causes or worsens thinking problems?
3. The special role of attention
4. The good old days bias
5. Treatment/Management

1. Attention, speed of processing, memory and executive functions:
What are they? How do these problems look in everyday life?

Common Cognitive Symptoms after Concussion

Symptoms (and some sub-categories)	Everyday life examples
Attention and Concentration focusing, dividing, sustaining, shifting, selecting	<ul style="list-style-type: none">• Zoning out; forgetful• Distractible• Trouble following conversations• Repeating questions; difficulty learning new things
Processing Speed Verbal processing, visual processing, scanning	<ul style="list-style-type: none">• More time to do things

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Implications for: <i>safety (e.g., driving/cycling/sport), school, work, social situations, personal relationships, other</i>	

2. Causes and perpetrators of cognitive problems after concussion

Causes of Cognitive symptoms

Direct organic effects of Concussion



- *Prior concussions makes things worse*

Causes of Cognitive Symptoms

Indirect causes (or exacerbators of symptoms)

Examples

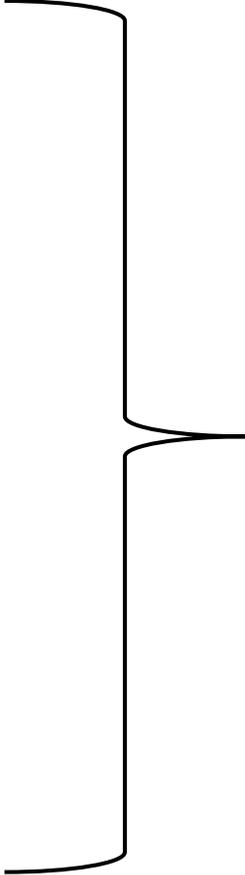
- Sleep disturbance/fatigue
- Headache pain
- Other pain
- Depression/anxiety
- Medications/substances with impact on thinking (e.g., sleeping pills; cannabis)
- Neuroendocrine problems
- **Attention problems (e.g., attention problems causing memory problems)**

Causes of Cognitive Symptoms

(ii) Indirect causes or exacerbators

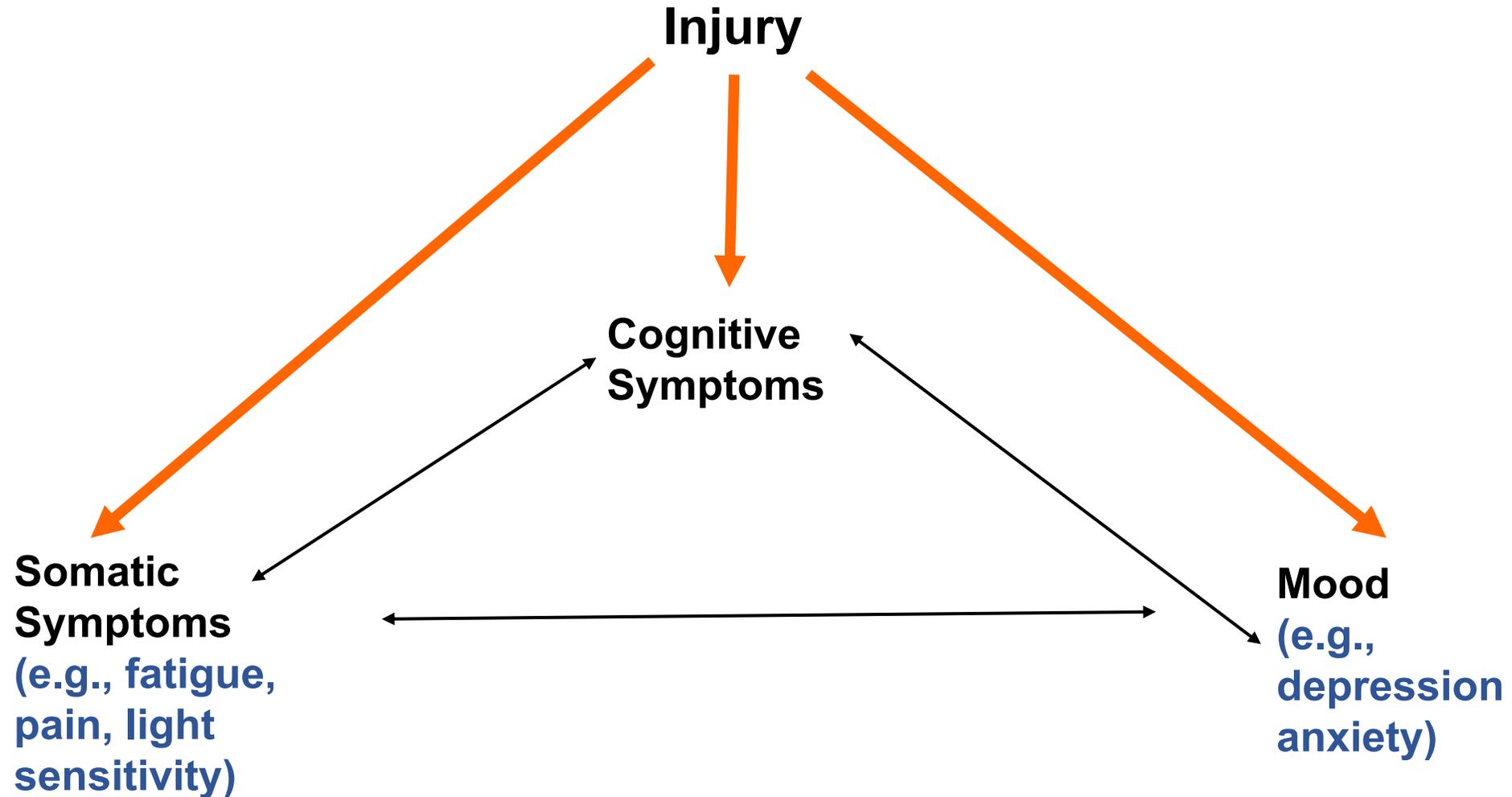
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- Sleep disturbance/fatigue
- Headache pain
- Other pain
- Depression/anxiety
- Medications/substances
- **Attention problems**



These may have been present prior to concussion or may have emerged since the concussion

The Vicious Cycle of Concussion



3. The Special Role of Attention

Attentional Processes

There are many types of attention

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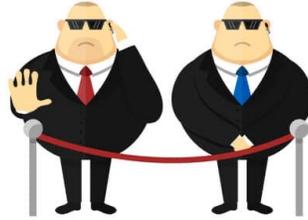
Selective Attention: the gatekeeper



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Sustained Attention: staying focused and resisting distraction



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Attentional Shifting / Divided Attention: shifting focus between tasks and multitasking



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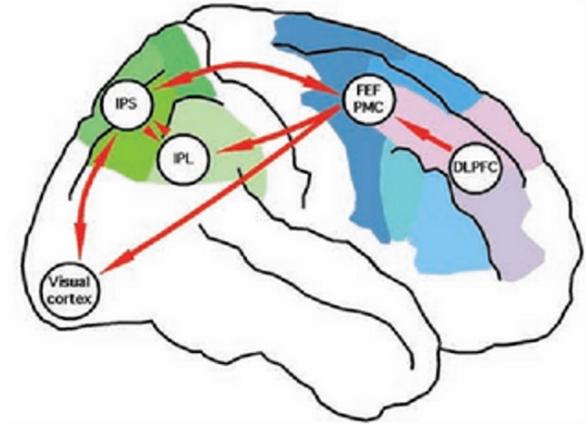
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Attention is special – it underlies all other cognitive processes

Attention is all over the Brain!

Controlled by neural networks **distributed** across the brain

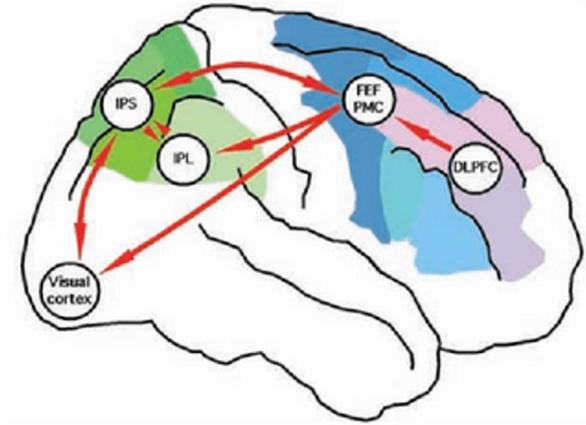
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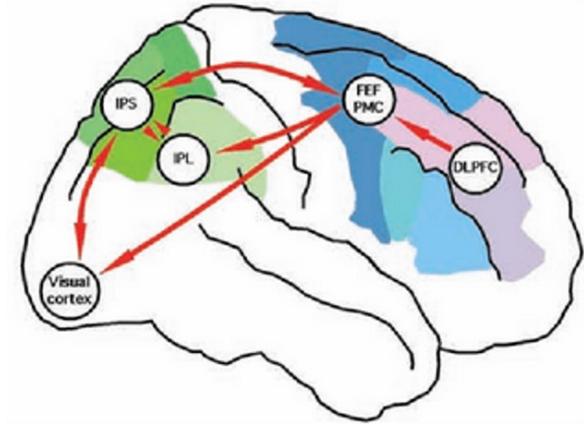


Because attentional networks are spread throughout the brain (i.e., not localized), more susceptible to fluctuations in our physical and mental state

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Because attentional networks are spread throughout the brain (i.e., not localized), more susceptible to fluctuations in our physical and mental state

i.e., anything that might decrease the brain's processing efficiency
(e.g., poor sleep, fatigue, cold/flu, hunger, thirst, anxiety, depression, stress, pain, etc.)

Attention's role in other cognitive processes...

Memory

We have to maintain attentional focus to “take in” and learn new information.

Language

Holding info/ideas in conscious mind is essential to read and to follow conversation

Executive functions (E.g., plan, multi-task, complete a goal)

We need to pay attention to hold information in mind's eye

For emotional well-being: Need to filter out (“not” focus on upsetting content)

An attention take away...

Improving attention by:

- maintaining physical health
- treating other factors that affect attention (e.g., sleep, mood, pain)
- identifying freshest part of the day

...can improve overall cognitive functioning

4. The Good Old Days Bias

Misinterpreting Cognitive Symptoms

The Good Old Days Bias Voormolen et al, 2020; Lange et al, 2012

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Overestimating our capacities before the concussion = “misattribution” errors

Before my concussion I never:

- forgot where I left my keys
- had trouble remembering someone's name / my own PIN number
- had a word on the tip of my tongue I couldn't remember
- had difficulty trouble-shooting a complex problem
- didn't feel like finishing my homework

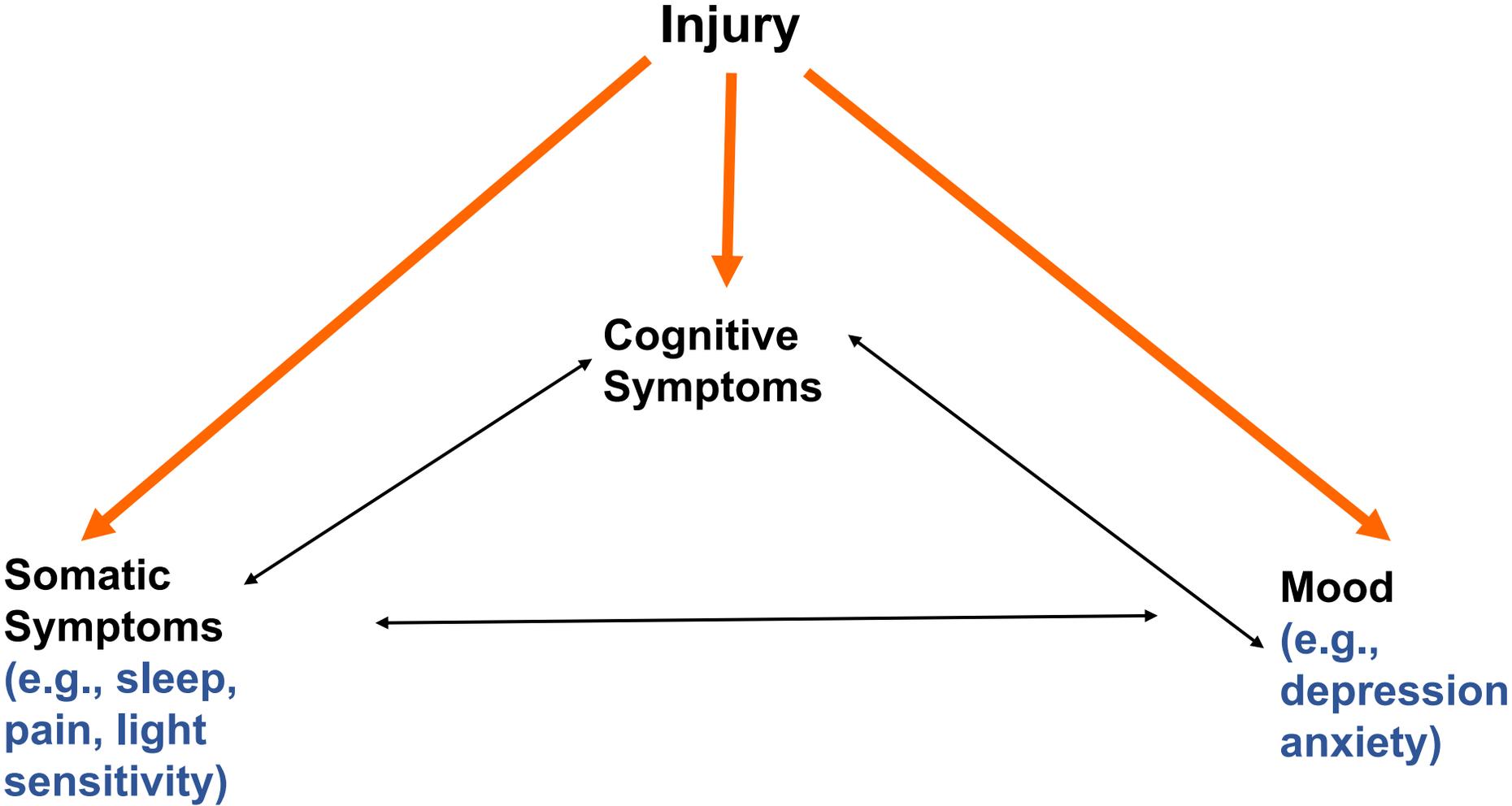
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Overestimating our capacities before the concussion = “misattribution” errors

- ***We can not know actual cause of an error/slip in any given situation***
- *But over-attributing to concussion can increase symptoms of stress, anxiety, depression...*
- *And help to perpetuate the vicious cycle of concussion*

The Vicious Cycle of Concussion



5. Management/Treatments for Cognition

Cognition Management/Treatments

1. Treating Indirect Causes of Cognitive Symptoms - *Headache/Pain; Sleep; Mood*

Addressing indirect causes of cognitive symptoms (breaking the vicious cycle of concussion)

How?

Step 1: Gain Self-Awareness

- (self) evaluate symptoms: sleep, fatigue, pain, stress/anxiety, mood (depression)

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Step 1: Gain Self-Awareness

- (self) evaluate symptoms: sleep, fatigue, pain, stress/anxiety, mood (depression). (Living guidelines)

Step 2: Address Symptom by Symptom

- **Sleep:** Insomnia CBT, sleep hygiene practices, talk to GP re: medications and/or sleep study.
- **Pain:** Talk to GP re medications / try over the counter medications; **Mindfulness***; **Pacing***
- **Stress/mood:** Cognitive Behaviour Therapy; **Mindfulness***; Psychotherapy; talk to GP re Medication
 - Drs. Snaiderman and Ruttan

Cognition Management/Treatments

2. Treating Indirect Causes of Cognitive Symptoms – [Energy Conservation](#) / [Fatigue](#)

The 4 P's



Cognition Management/Treatments

Manage your energy to help your brain/body rest

Conserve physical and mental energy to enhance cognitive functioning

PRIORITIZE

PACE

PLAN

POSITION

Cognition Management/Treatments

4 P's – PRIORITIZE

PRIORITIZE – What is most important?

Is the activity:

- **Urgent** (must be done today)
- **Important** (must be done in the next few days)
- **Somewhat delayable** (must be done this week or month)
- **Something that can wait** (don't need to/can't do)
- **Something someone can do for you?**

Cognition Management/Treatments

4 P's – Plan

PLAN – What are you going to do?

- **When are you going to do the activity?**
 - Remember it may take **more time**
- **How are you going to organize your activities?**
 - When do you feel best throughout the day?
 - What else do you need to do today?

Cognition Management/Treatments

4 P's – Pace

PACE – How are you going to do it?

Try to:

- **Take breaks** when necessary
- **Break down tasks** into smaller stages
- **Spread out tasks** throughout the day

Cognition Management/Treatments

4 P's – Position

POSITION – Where are you going to do it?

Consider:

- **Environment** (will there be distractions?)
- **Body position** (consider your posture and body position while completing tasks)

Cognition Management/Treatments

3. Treating Cognitive Symptoms: Approaches with good evidence

Mindfulness Meditation

Entails focusing on being highly aware of what you are feeling and sensing in the moment - without interpretation or judgment

- E.g., Mindfulness Based Stress Reduction
- E.g., Mindfulness Based Cognitive Therapy

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Demonstrated benefits for...

- Sustained attention
- Also... Improves indirect causes of cognitive symptoms (i.e., anxiety, stress, pain and depression)

Economical Apps, including guided meditations: e.g. Calm, Insight Timer, Headspace)

Cognition Management/Treatments

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 - GMT provides strategies, such as the “STOP!” Technique to tackle this

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 - GMT provides strategies, such as the “STOP!” Technique to tackle this
- Another goal management problem is not having control over attention, being absentminded (slipping into autopilot) and resultant forgetfulness
 - Interventions and strategies to help stay on track with tasks to be more productive day to day

Cognition Management/Treatments

4. Treating Cognitive Symptoms: Approaches with good evidence

Some general, evidenced-based concepts

For concussion recovery (including cognitive symptoms)

Physical Exercise (Sub-threshold exercise) – Dr. Bayley

For brain health

- Neuroplasticity is the capacity of the brain to change and rewire itself based on an individual's experience
- Environmental enrichment (like use it or lose it) promotes neuroplastic change and healthier aging
- Engage in mentally effortful activity (novel, challenging, effortful, engaging, intensive)
 - Learn something new. Do thinking activities and change these up often (e.g., read, play a musical instrument, learn a new language, build something, etc.)

Some Take Aways

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- Attention plays a disproportionate role in all aspects of cognition AND attention can be disrupted by both physical and mental health factors (dehydration, stress, sleep, etc.)
- Misattribution errors (overestimating capacities before the concussion) can increase stress/worry
- Management approaches (no magic bullet)
 - Address indirect causes (headache/pain/sleep)
 - Sound interventions/strategies: GMT, mindfulness meditation, physical exercise (sub-threshold exercise)
 - Enhance brain health: environmental enrichment

THANK YOU

Other Resources

Here are some educational materials:

Guideline for Concussion & Prolonged Symptoms
for Adults 18 years of Age or Older

<https://braininjuryguidelines.org/concussion/index.php?id=154>