## Roll up your sleeves: Strategies for the management of TBI-related sequelae

Kim A. Gorgens, Ph.D., ABPP

Kimberly.Gorgens@du.edu

@bubblewrapbrain





## Learning Objectives

- 1) Participants will be able to list at least three strategies to manage common sequelae of brain injury
- 2) Participants will be able to generate intervention strategies informed by the information available to them
- 3) Participants will be able to list an effective tertiary prevention strategy

#### Disclosure

I have no actual or potential conflict of interest in relation to this presentation.

#### Research and funding support from:

Colorado Brain Injury Program (MINDSOURCE), Vista Lifesciences, The Barton Institute for Philanthropy and Social Enterprise, and a TBI Implementation Grant to Colorado Brain Injury Program, Funded by TBI Implementation Grant #H21MC17232 from the U.S. Department of Health and Human Services, Administration on Community Living (ACL).

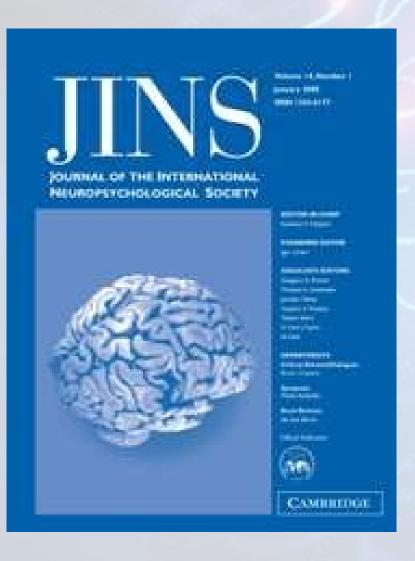
The view expressed here are the responsibility of this presenter and do not necessarily represent the official views of ACL, the University of Denver or the Colorado Brain Injury Program.

# After a mTBI, "most individuals return to baseline functioning within 3 months to 1 year"

But....7% to 33% have persistent symptoms

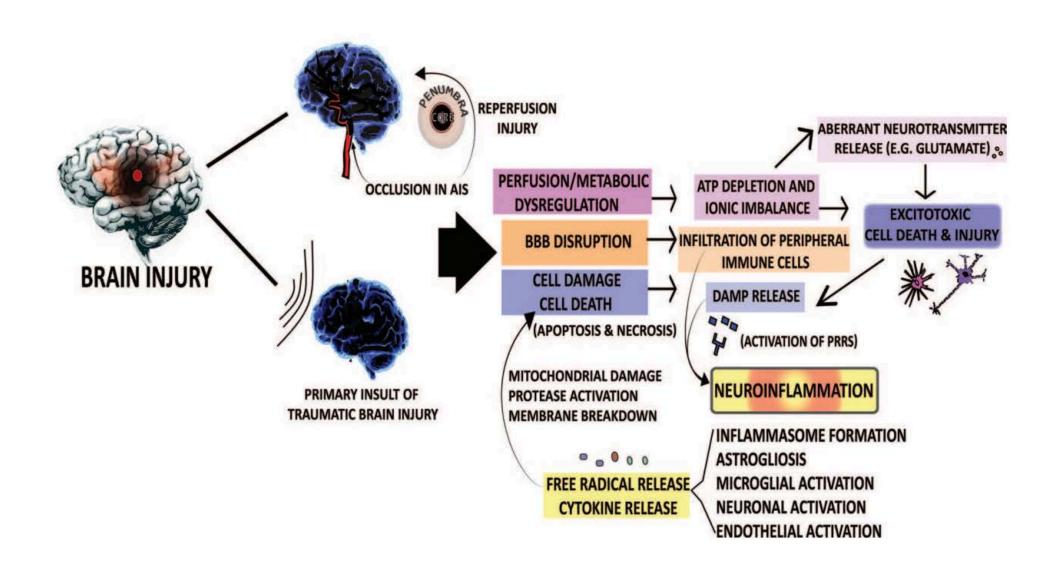
Belanger et al., 2005

## "Miserable Minority"



- "Fragile" brains
- •Genetic risks for poor outcome (e.g., apolipoprotein E gene)
- Pre-injury personality
- •"Good old Days" bias
- Primary or secondary gain

## Post-Injury Sequelae



#### Sequelae of Brain Injury

#### **Physical & Medical**

#### Cognitive

#### **Emotional/Behavioral**

Balance

Fine and gross motor skills

Range of motion/flexibility

Coordination

Spasticity (stiffness) and ataxia (shakiness)

Pain, particularly headache

Changes in or loss of senses

Seizure disorder

Hastened aging process

Quality of speech and swallowing issues

Endurance

Sleep disturbance

Information processing

Orientation to person, place and time

Sequencing

Problem-solving and judgment

Memory

Planning and organizing

Attention/concentration

Communication problems (word-finding, understanding others, staying on topic)

Flexible thinking

Being able to initiate or start things

Depression

Anxiety

Aggression

Flat or restricted affect

Mood swings

**Emotional lability** 

Social skills

Disinhibition

Apathy

Exaggerated personality

Changes in drives (hunger, sex, and temper)

Impulsivity

# The BIG THREE



### Post-Traumatic Headaches (PTH or PTHA)

- Chronic post-traumatic headache=12+ months after injury
  - Rates reach up to 95%
    - 71% after moderate/severe TBI and 91% after mild TBI (mTBI) at 1 year (Lucas, 2015)
    - 61% daily headaches, 39% migraine (26% had new onset of a migraine-like disorder) and 9% tension-type headaches (Kuczynski, Crawford, Bodell, Dewey, & Barlow, 2013)
    - The report of chronic pain is inversely correlated with severity of injury

## Why and How

- Existing vulnerability
- Cervicogenic
- Neuro-inflammation
  - "Inflammatory-evoked enhancement of peripheral cranial nociception, rather than changes in supraspinal pain mechanisms play a role in the initial emergence of PTH"
    - (Benromano, Defrin, Ahn, Zhao, Pick & Levy, 2014)
- Damaged pain pathways?
  - "Damage to pain modulatory systems along with chronic cranial sensitization underlies the development of CPTHA"
    - (Defrin, Riabinin, Feingold, Schreiber, & Chaim, 2015)
- Estrogen disruption?
  - (Fortress, Avcu, Wagner, Dixon, & Pang, 2019)
- Psychology
  - Conditioned pain avoidance, stress



#### Headache

- There are no evidence-based treatment guidelines for PTH management
  - (Moye & Pradhan, 2017; The Journal of Headache and Pain, 11/2019)
- Medication
  - Antidepressant, antiepileptics, triptans, OTC options
  - 15% develop MEDICATION OVERUSE HEADACHE (MOH)
    - "Central sensitization that produces increased pain responsivity in both cephalic and peripheral regions"
- Physical Therapy (e.g. neck strengthening)
- Cognitive Behavioral Therapy (CBT)
- Relaxation techniques
- Aerobic exercise
  - 60 seconds at a time
  - Promotes neurogenesis
  - See activity prescription next slide
- New horizons
  - Cranial-nerve Non-invasive Neuromodulation (CN-NINM)
  - DOR agonists (also in clinical trials for anxiety and depression; Moye, Tipton, Dripps, Sheets, Crombie, Violin, & Pradhan, 2019)
  - Clinicaltrials.gov



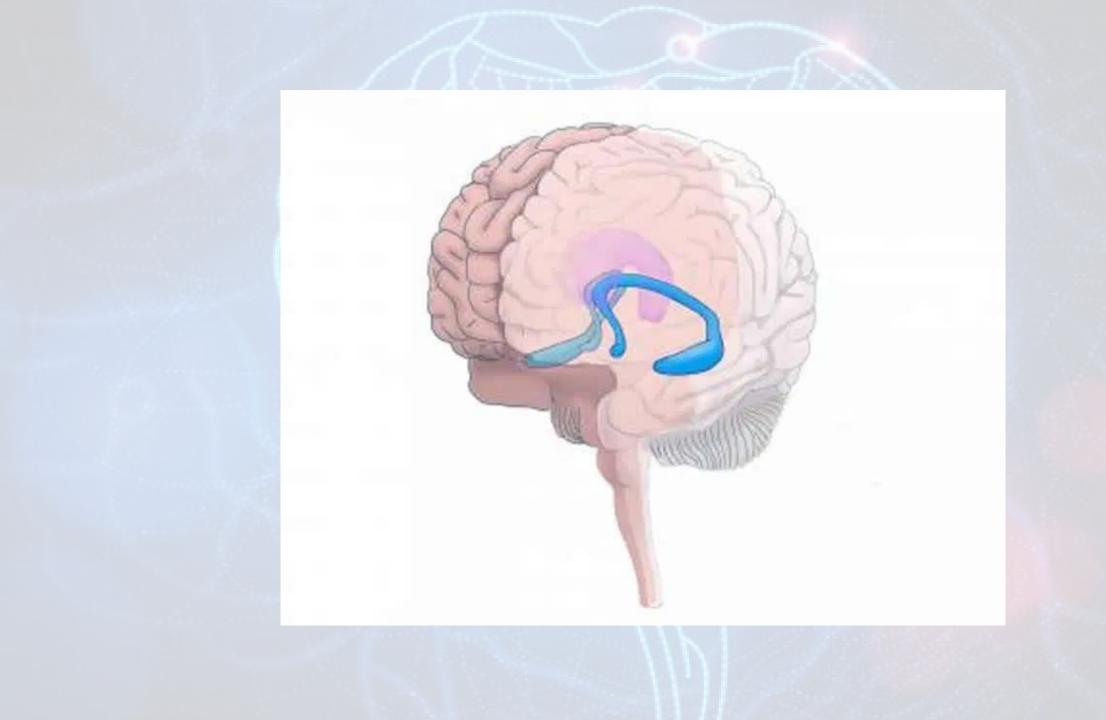


#### Mood

- Anxiety and depression have the greatest impact than cognitive impairment on social and occupational functioning following brain injury (Bertisch et al., 2013)
- 37%-50% of people report clinically significant levels of anxiety following TBI (Osborn, Mathias, & Fairweather-Schmidt, 2015)
  - Post-traumatic stress disorder, generalized anxiety disorder, obsessivecompulsive disorder, panic disorder, specific phobia, and social anxiety disorder (Sasha, Sutherland, Syb, Mainland, & Ornstein, 2015)
- Suicidal ideation reported in more than 80% of persons after TBI
  - 4 times more likely to die "intentionally"
    - (Varaamo, Jussi, Sami, Seppo, & Matti, 2015)

## Why and How

- Hippocampal volume loss and neuroinflammation
  - "Understanding trauma-induced hippocampal subfield volume changes in the context of age and health" (2020)
- Glial cell pathology
  - Two pathways of astrogliopathology: reactive astrogliosis where astrocytes can have anisomorphic/severe scar forming effects or astrocytopathy, that includes the atrophy/degeneration, with loss of function and pathological remodeling of astrocytes
    - See Kim, Healey, Sepulveda-Orengo, & Reissner (2018). Astroglial correlates of neuropsychiatric disease: From astrocytopathy to astrogliosis. *Progress in Neuropsychopharmacology & Biological Psychiatry*, 87, 126-146.
- White matter abnormalities
  - "..anxiety was associated with more restricted diffusion and greater anisotropy in regions of crossing/diverging fibers"
    - (Davenport, Lim, & Sponheim, 2015)
- Pituitary dysfunction
  - Growth hormone (GH) is the most common hormone lost after TBI, followed by ACTH, gonadotropins (FSH and LH), and TSH
    - (Tanriverdi, Schneider, Aimaretti, Masel, Casanueva, & Kelestimur, 2015)
  - Growth hormone deficiency has adverse effects on executive abilities and mood=anxiety
    - (Ioachimescu, Hampstead, Moore, Burgess, & Phillips, 2015)
- Psychology
  - Expectancies, role changes, subjective vs. objective deficits, relationship changes
- Premorbid psychopathology/existing vulnerability



#### **Affective Problems**

- Improving caregiver psychological health
  - (Raj et al., 2014)
- CBT/ACT
  - Thought stopping
  - Relaxation techniques
- Watch psychobiotic research
  - Nutrition?
- Neuromodulation
  - (Koek, Roach, Athanasiou, van 'T Wout-Frank, & Philip, 2019)

#### **Progressive Muscle Relaxation**

Our bodies respond automatically to stressful situations thoughts by becoming tense. The opposite relationship also works: a good way of relaxing the mind is to deliberately relax the body.

In a progressive muscle relaxation each muscle group is tensed in turn, and the tension is then released. This relaxes the muscles and allows you to notice the contrast between tension and relaxation.

Relaxaton should be enjoyable so if any part of the exercise is too difficult skip it for the moment. If you have any injuries you may wish to leave out that part of the exercise.

#### Preparation

Lie down flat on your back, on a firm bed, a couch, or on the floor. Support your head and neck with a pillow or cushion. Alternativelty sit in a comfortable chair with your head well-supported. Close your eyes if you are comfortable doing so.

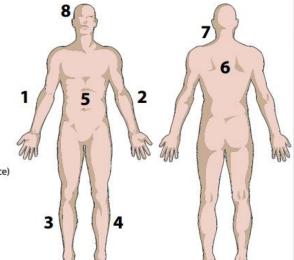
#### Instructions

Focus your attention on different parts of your body in sequence. Go through the sequence three times:

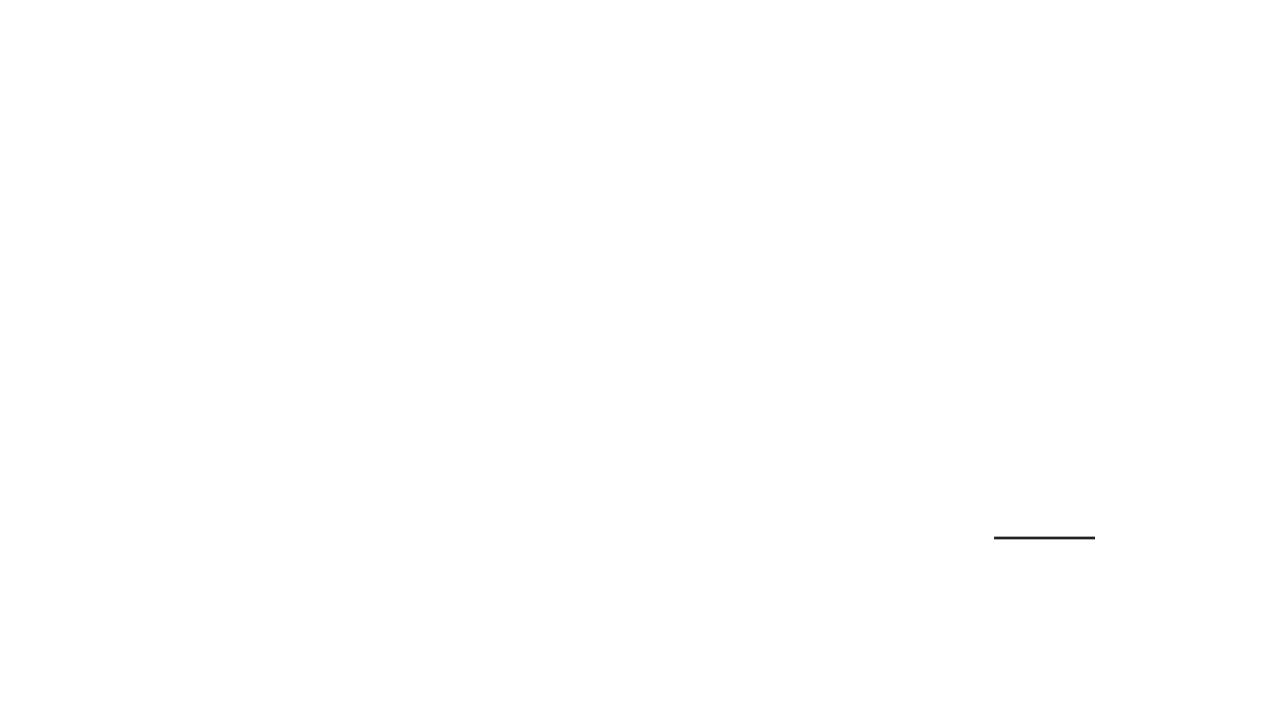
- 1) Tense & release: Tense that body part, hold it for a few moments, then relax
- 2) Lightly tense & release: Tense that body part with just enough tension to notice, then relax
- 3) Release only: Just pay attention to each muscle group and decide to relax it

#### Recommended sequence

- 1 Right hand & arm (clench the fist & tighten the muscles in the arm)
- 2 Left hand & arm
- 3 Right leg (tense the leg, lifting the knee slightly)
- 4 Left leg
- 5 Stomach & chest
- 6 Back muscles (pull the shoulders back slightly)
- 7 Neck & throat (push the head back slightly into the pillow/surface)
- 8 Face (scrunch up the muscles in your face)







## Sleep

- Up to 80% report sleep problems after injury
  - (Mathias & Alvaro, 2012)
  - Insomnia, increased sleep need, and excessive daytime sleepiness
  - Also sleep-related breathing disorder or posttraumatic hypersomnia (Ouellet, Beaulieu-Bonneau, & Morin, 2015)
- Changes in sleep stages include an increased proportion of stage 1 and 2 sleep, decreases in REM sleep, reduced REM sleep latency
  - (Duclos, Beauregard, Bottari, Ouellet, & Gosselin, 2015)
- May mediate relationship to poor short and long-term outcomes
  - Mollayeva, Mollayeva, Pacheco, D'souza, & Colantonio, 2019)

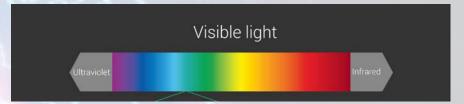


## Why and How

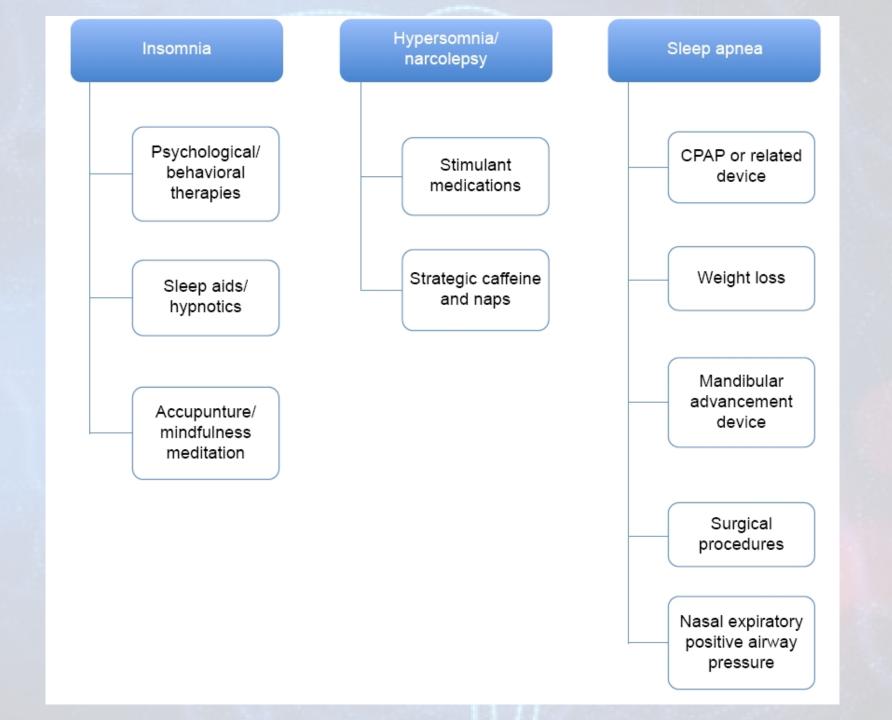
- Existing vulnerability
- Complex interplay between pathophysiological processes (structural, neuroelectrical, or neurochemical levels), psychological factors (e.g., sleep-related habits or TBI-related psychopathology), environmental factors (e.g., noises, light, or pain), and social factors (e.g., social roles related to work or family)
- Decreased secretion of hypocretin
  - A neuropeptide involved in sleep-wake regulation
    - (Baumann et al., 2015)

#### **Treatment**

- Sleep hygiene and strategies
- Strategic napping



- Blue light therapy (Sinclair, Ponsford, Taffe, Lockley & Rajaratnam, 2014; Vanuk, et al., 2018)
  - Light strikes the retina and blue wavelengths specifically stimulate intrinsically photosensitive retinal ganglion cells (ipRGCs), which respond by transmitting irradiance signals to a number of sub-cortical nuclei, including the the suprachiasmatic nucleus (SCN), the hypothalamus, the locus coeruleus and the brainstem=NE and lower melatonin.
- Melatonin
  - Antioxidant, anti-inflammatory, neuroprotective
    - See Lin, Chao, Chao, Honglu, Li, Zheng, Xu, Xiupeng, Liu, Yinlong, Hou, Lijun, ... Ji, Jing. (2016). Melatonin attenuates traumatic brain injury-induced inflammation: A possible role for mitophagy. *Journal of Pineal Research*,61(2), 177-186 and Grima, N., Ponsford, J., St. Hilaire, M., Mansfield, D., & Rajaratnam, S. (2016). Circadian Melatonin Rhythm Following Traumatic Brain Injury. *Neurorehabilitation and Neural Repair*, 30(10), 972-977.
- Diagnosis and specific treatment
  - See next slide (from Viola-Saltzman & Watson, 2012)



#### **Guidelines For Better Sleep**

Sleeping well is a habit that you can learn! Small changes can have big effects. Start today by following these rules:

#### Take care of your body

- · Do not drink caffeine: no tea, coffee, or coca-cola after 4 o'clock
- · Do not eat a big or spicy meal late in the evening
- Do not go to bed hungry
- · Avoid alcohol as it interferes with sleep

**Physical exercise**, such as a brisk walk, in the late afternoon can help to make your body tired and help you to sleep. Try to do some exercise every day.

**Sleep only at night-time** and do not have day-time naps, no matter how tired you feel. Naps keep the problem going by making it harder for you to get to sleep the next night.

Having a regular bedtime routine teaches your body when it's time to go to sleep.

- · Have a soothing drink like camomile tea or a milky drink
- · Have a bath, or a routine of washing your face and brushing your teeth
- · Go to bed at same time each night
- When in bed think of nice things (e.g. think of 5 nice things that happened that day they might be big or small, such as a nice conversation, seeing the sunshine, or hearing nice music on the radio)
- Do a relaxed breathing exercise (one hand on stomach the other on your chest, deliberately slow your breathing, breathe deeply in your stomach instead of high in your chest)
- Try and wake up the same time every day, even if this is tiring to begin with

**Coping with bad dreams can be difficult.** Some people don't like relaxation before going to sleep, or are scared of letting go. If that is you, try these preparation techniques instead:

- Prepare yourself in case you have bad dreams by thinking of a bad dream then think of a different ending for it. Practice this new ending many times before going to sleep.
- Before going to sleep prepare to re-orient yourself when you wake from a bad dream.
- Remind yourself that you are at home, that you are safe. Imagine your street, buses, local shops.
- Put a damp towel or a bowl of water by the bed to splash your face, place a special object by the bed, such as a photograph, or a small soft toy.
- Practice imagining yourself waking up from a bad dream and reorienting yourself to the present, to safety
  by splashing your face, touching special object, having a bottle of rose or lavender essential oil to sniff,
  going to window to see surroundings.
- When you wake up from a bad dream- move your body if you can and reorient yourself immediately (touching an object, wetting face, going to the window, talk to yourself in a reassuring way)

#### Make your bedroom a pleasant place to be

- Get a nightlight
- · Keep it clean and tidy
- Introduce pleasant smells such as a drop of lavender oil onto the pillow
- Get extra pillows
- · Make sure that your home is safe e.g. doors locked, windows closed.

**REMEMBER:** Bed is for sleeping, so if you cannot sleep after 30 minutes, get up and do another activity elsewhere such as reading or listening to music (try and avoid TV as it can wake you up). After 15 minutes return to bed and try to sleep again. If you still can't sleep after 30 minutes get up again. Repeat this routine as many times as necessary and only use your bed for sleeping in.

#### Caveat: NAPS

#### How Long to Nap



## 10 to 20 Minutes

This power nap is ideal for a boost in alertness and energy, experts say. This length usually limits you to the lighter stages of non-rapid eye movement (NREM) sleep, making it easier to hit the ground running after waking up.

#### 30 Minutes

Some studies show sleeping this long may cause sleep inertia, a hangover-like groggy feeling that lasts for up to 30 minutes after waking up, before the nap's restorative benefits become apparent.

#### 60 Minutes

This nap is best for improvement in remembering facts, faces and names. It includes slow-wave sleep, the deepest type. The downside: some grogginess upon waking up.

#### 90 Minutes

This is a full cycle of sleep, meaning the lighter and deeper stages, including REM (rapid eye movement) sleep, typically likened to the dreaming stage. This leads to improved emotional and procedural memory (i.e. riding a bike, playing the piano) and creativity. A nap of this length typically avoids sleep inertia, making it easier to wake up.

- Assess the problem
  - Pittsburgh Sleep Quality Index (PSQI)—SEE NEXT
- •Sleep Treatment and Education Program for Students (STEPS) and STEPS-TECH
  - Sleep hygiene and stimulus control

me				_ Da	ate
	Sleep Quality Assessme	ent (l	PSQI)	100	
erentiates "poo	What is PSQI, and what is it n eep Quality Index (PSQI) is an effective instrument used to meas or from "good" sleep quality by measuring seven areas (compon- sleep efficiency, sleep disturbances, use of sleeping medications	sure the qu ents): subj	ality and pa jective sleep	quality,	sleep latency,
ISTRUC	TIONS.				
e following que	stions relate to your usual sleep habits during the past month on the majority of days and nights in the past month. Please answe			uld indica	ate the most
During	the past month,				
When have:     How long (ir     What time h     A. How man	you usually gone to bed? minutes) has it laken you to fall askep each night? ave you usually gotten up in the morning? ny hours of actual sleep did you get at night? ny hours were you in bed?				
5. During the past m	rorth, how often have you had trouble sleeping because you	Not during the past month (0)	Less than once a week (1)	Once or twice a week (2)	Three or more times a week (3)
A. Cannot getto s	sleep within 30 minutes				
B. Wakeup in the	middle of the nightor early morning				
C. Have to get up	to use the bathroom				
D. Cannotbreath	e comfortably				
E. Cough or snow	e loudly				
F. Feel toocdd					
G. Feel too hot					
H. Have bad dream	ms				
I. Have pain					
J. Other reason (s	s), please describe, including how often you have had trouble sleeping because of this reason (s):				
6. During the past m	anth, how often have you taken medicine (prescribed or "over the oounter") to help you sleep?				
7. During the past m social activity?	onth, how often have you had trouble staying awake while driving, eating meals, or engaging in				
8. During the past m	onth, how much of a problem has it been for you to keep up enthusiasm to get things done?				
9. During the past m	onth, how would you rate your sleep quality overall?	Very good (0)	Fairly good (1)	Fairly bad (2)	Very bad (3)
	Scoring				
Component 1	#9 Score		С	1	
Component 2	#2 Score (<15min (0), 16-30min (1), 31-60 min (2), >60min (3))				
Component 3	+ #5a Score (if sum is equal 0=0; 1-2=1; 3-4=2; 5-6=3) #4 Score (>7(0), 6-7 (1), 5-6 (2), <5 (3)		C	2	
Component 4	(total # of hours a sleep) / (total # of hours in bed) x 100				
	>85%=0, 75%-84%=!, 65%-74%=2, <65%=3		C	4	
Component 5	# sum of scores 5b to 5j (0=0; 1-9=1; 10-18=2; 19-27=3)			5	
Component 6 Component 7	#6 Score #7 Score + #8 score (0=0; 1-2=1; 3-4=2; 5-6=3)		C	6 7	
- zponom /					
Add ti	he seven component scores together Glob	al PSQI			

A total score of "5" or greater is indicative of poor sleep quality.

If you scored "5" or more it is suggested that you discuss your sleep habits with a healthcare provider

Lastly, this presentation will provide some tips around how to manage your technology use to protect your sleep. Research shows that technology use habits are one of the biggest factors that negatively affect sleep in college students and efficient work habits. Technological interruptions can interfere with your homework time, causing you to multitask rather than focus on your work. This actually leads to more mistakes on your work, as well as more inefficient time use compared to when you do the work without interruptions. Additionally, behaviors such as sleeping with your phone and leaving notifications on at night can be disruptive to your sleep quality. Even checking and responding to messages right before bedtime can lead to sleep interference due to light exposure from backlit screens and thinking about social interactions right before bedtime. Thus, here are four additional tips for setting boundaries around technology use to help you manage your sleep and work more effectively.

#### 1. Communication batching

Try "batching" your communication to only certain times of day, such as checking email or text messages in the evening only at a certain time (e.g., 7-9 pm). This allows you to focus more on your other work tasks to finish them more quickly and efficiently and also allow you more downtime away from technological devices. Structure these times around your optimal "work time," making sure to reserve the time when your brain is at its best for homework time and check and respond to messages as a reward for completing your work. The most important strategy for having control over communication batching is to turn off all of your push notifications for email, social media, etc. These types of alerts make it much too tempting to check in at different times, so make sure you stay in control by deciding yourself when to see if you've received messages.

#### 2. No interruptions time

Create your own "no interruptions time" or "no interruptions space" by turning off electronic devices at certain times of day. This reduces the temptation to check in with your messages and also helps you have a quiet and remote space—like the library—to get work done or have time to relax. If doing homework, make sure you gather all the resources that you need to complete the work so that you can turn off your laptop to reduce temptation to surf on the web. You will be amazed at how much you get done, and how quickly you get done, when you've taken away all distractions!

#### 3. Communicate expectations

Communicate expectations to others about your communication batching and response times so people can be aware of your typical ebb and flow of availability. Once you've established a routine, this makes others aware of your availability and less likely to contact you at random times throughout the day (and more importantly, expect an immediate response).

#### 4. Manage responses

Avoid "escalation of expectations" by monitoring your response time (even if you are "checking" responses). Escalation of expectations is a phenomenon in which people learn to expect faster and faster response times from what you based on your previous response rates. For example, if you typically respond to people within 30 min, they come to expect this availability from you all the time (even when it is impossible). Then, if you happen to respond in 10 min another day, this might set a new, and faster, expectation of availability that is difficult for you to maintain.

#### 5. Protect bedtime

Perhaps the most important boundaries you need to set around technology are in relation to your bedtime routines. It is absolutely critical to protect your sleep time from technological interruptions. This includes turning your devices completely off before you go to bed. If you use your phone as an alarm, then you should put your phone in "sleep mode/do not disturb" or "airplane mode" so that the alarm will still work but that no other communications will come in. You should also try to avoid any type of backlit screens (phones, tablets, and laptops) 1–2 hr before bedtime to allow your body to naturally relax and become drowsy. Additionally, checking messages before bedtime can wake you up, especially if you are having a stressful social interaction. Finally, wait at least 1 hr after waking to check messages; use it as motivation to get up and ready more quickly!

# Cognitive and Behavioral Complaints

## Colorado Symptom Checklist

#### **SYMPTOM QUESTIONNAIRE**

In the past two months, how much have you been bothered by the following problems? **Please** only mark one box per item.

	MEMORY CONCERNS	I do not experience this problem at all	L experience this problem but it does not bother me	I am mildly bothered by this problem	I am moderately bothered by this problem	I am extremely bothered by this problem
1.	Losing or misplacing important items (e.g., keys, wallet, papers)					
2.	Forgetting what people tell me					
3.	Forgetting what I've read					
4.	Losing track of time					
5.	Forgetting what I did yesterday					
6.	Forgetting things I've just learned					
7.	Forgetting meetings/ appointments					
8.	Forgetting to turn off appliances (e.g., iron, stove)					

	SENSORIMOTOR	experience this problem at all	bothered by this problem	bothered by	I am extremely bothered by this problem
1.	Feeling physical pain (e.g., headache, body pain).				
2.	Getting enough sleep				
3.	Feeling fatigued				
4.	Feeling sensitive to light				

	DELAYED PROCESSING	I do not experience this problem at all	I experience this problem but it does not bother me	I am mildly bothered by this problem	I am moderately bothered by this problem	I am extremely bothered by this problem
1.	Trouble following conversations					
2.	Remembering only one or two steps when someone is giving me instructions or directions					
3.	Taking too long to figure out what someone is trying to tell me					

	INHIBITION PROBLEMS	I do not experience this problem at all	I experience this problem but it does not bother me	I am mildly bothered by this problem	I am moderately bothered by this problem	I am extremely bothered by this problem
1.	Saying things without thinking					
2.	Doing things without thinking					
3.	Not following directions					
4.	Dominating conversations					
5.	Interrupting when others are speaking					

			experience this problem at all	I experience this problem but it does not bother me	this problem	moderately bothered by	I am extremely bothered by this problem
]		Difficulty concentrating					
2	2.	Easily distracted					
3	3.	Difficulty concentrating in noisy environments					
4	<b>l</b> .	Difficulty following conversations					
4	5.	Difficulty concentrating on challenging tasks, such as work or paying bills					

	LANGUAGE PROBLEMS	I do not experience this problem at all	I experience this problem but it does not bother me	I am mildly bothered by this problem	I am moderately bothered by this problem	I am extremely bothered by this problem
1.	Difficulty understanding what people tell me					
2.	Difficulty understanding what I've read					
3.	Difficulty finding the right word when speaking					
4.	Difficulty getting people to understand what I am trying to say					
5.	Difficulty writing emails, papers, etc.					

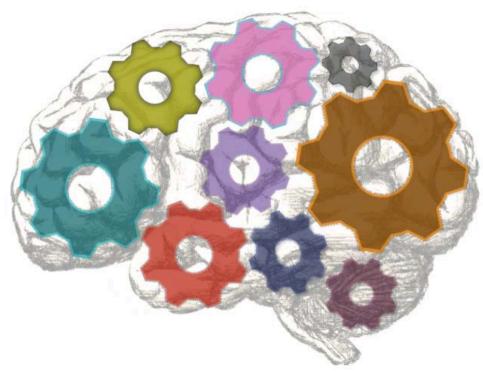
	PHYSICAL and SENSORIMOTOR PROBLEMS	experience this problem at all	I experience this problem but it does not bother me	I am mildly bothered by this problem	I am moderately bothered by this problem	I am extremely bothered by this problem
1.	Feeling physical pain (e.g., headache, body pain).					
2.	Getting enough sleep					
3.	Feeling fatigued					
4.	Feeling sensitive to light					
5.	Focusing my eyes					
6.	Lacking depth perception					

	MENTAL FLEXIBILITY	I do not experience this problem at all	-	I am mildly bothered by this problem	I am moderately bothered by this problem	I am extremely bothered by this problem
1.	Difficulty deciding what to do when faced with a new					
	problem.					
2.	Difficulty changing my mind once I've made a decision					
3.	Difficulty learning a new way of doing things					
4.	Struggling to understand why people do things differently than me					

	ORGANIZATION PROBLEMS	I do not experience this problem at all	I experience this problem but it does not bother me	I am mildly bothered by this problem	I am moderately bothered by this problem	I am extremely bothered by this problem
1.	Difficulty keeping to a schedule					
2.	Difficulty prioritizing tasks					
3.	Difficulty starting tasks					
4.	Difficulty switching from one task to another					
5.	Difficulty completing tasks					
6.	Difficulty completing tasks correctly					
7.	Keeping up with time-sensitive tasks (e.g., bill pay, work)					

	EMOTIONAL PROBLEMS	I do not experience this problem at all	I experience this problem but it does not bother me	bothered by this problem	bothered by	I am extremely bothered by this problem
1.	Feeling anxiety					
2.	Feeling irritation					
3.	Crying easily					
4.	Feeling depression					
5.	Feeling traumatized					
6.	Overreacting to events					

#### Cognitive Strategies for Clients, Community Mental Health and Criminal Justice Professionals







## **Bookmark These Resources**

#### **TBI Toolkit**

## www.mirecc.va.gov/visn19/tbi toolkit

#### Free Online Toolkit



Developed by researchers at the Department of Veterans Affairs, this toolkit is designed to assist providers in identifying TBI and associated co-occurring problems and determining potential need for further evaluation and/or mental health treatment modification.

Click <u>here</u> to access the toolkit. Click <u>here</u> and open the "Training Resources" menu for valuable slides from the initial training on this toolkit.

The goal is to offer providers working with clients who have a history TBI and mental health symptoms the following:

- · Background information/Education
- · Screening and Assessment Tools
- · Interventions and Treatment Modification Suggestions
- Additional resources

## Colorado Kids with Brain Injury www.cokidswithbraininjury.com



## Ohio State University Accommodating the Symptoms of TBI

Presented by

## Ohio Valley Center for Brain Injury Prevention and Rehabilitation

with contributions from Minnesota Department of Human Services
State Operated Services

Developed in part with support of a grant from the US Department of Health and Human Services, Health Resources and Services Administration (HRSA) to Ohio Rehabilitation Services Commission and The Ohio State University

Order here <a href="https://osuwmcdigital.osu.edu/sitetool/sites/ohiovalleypublic/documents/AccommodationOrderForm2019.pdf">https://osuwmcdigital.osu.edu/sitetool/sites/ohiovalleypublic/documents/AccommodationOrderForm2019.pdf</a>

#### References

Kuczynski, A., Crawford, S., Bodell, L., Dewey, D., & Barlow, K. (2013). Characteristics of post-traumatic headaches in children following mild traumatic brain injury and their response to treatment: A prospective cohort. Developmental Medicine & Child Neurology, 55(7), 636-641.

Benromano, T., Defrin, R., Ahn, A., Zhao, J., Pick, C., & Levy, D. (2015). Mild closed head injury promotes a selective trigeminal hypernociception: Implications for the acute emergence of post-traumatic headache. European Journal of Pain, 19(5), 621-628.

Defrin, R., Riabinin, M., Feingold, Y., Schreiber, S., & Pick, C. (2015). Deficient Pain Modulatory Systems in Patients with Mild Traumatic Brain and Chronic Post-Traumatic Headache: Implications for its Mechanism. Journal of Neurotrauma, 32(1), 28-37.

Fortress, Avcu, Wagner, Dixon, & Pang. (2019). Experimental traumatic brain injury results in estrous cycle disruption, neurobehavioral deficits, and impaired GSK3β/β-catenin signaling in female rats. Experimental Neurology, 315, 42-51.

Moye, L., & Pradhan, A. (2017). From blast to bench: A translational mini-review of posttraumatic headache. Journal of Neuroscience Research, 95(6), 1347-1354.

Moye, Tipton, Dripps, Sheets, Crombie, Violin, & Pradhan. (2019). Delta opioid receptor agonists are effective for multiple types of headache disorders. Neuropharmacology, 148, 77-86.

Bertisch, H., Long, C., Langenbahn, D., Rath, J., Diller, L., & Ashman, T. (2013). Anxiety as a primary predictor of functional impairment after acquired brain injury: A brief report. Rehabilitation Psychology, 58(4), 429-35.

Osborn, Mathias, Fairweather-Schmidt, & Anstey. (2017). Anxiety and comorbid depression following traumatic brain injury in a community-based sample of young, middle-aged and older adults. Journal of Affective Disorders, 213, 214-221.

Mallya, S., Sutherland, J., Pongracic, S., Mainland, B., & Ornstein, T. (2015). The Manifestation of Anxiety Disorders after Traumatic Brain Injury: A Review. Journal of Neurotrauma, 32(7), 411-421.

Vaaramo, K., Puljula, J., Tetri, S., Juvela, S., & Hillbom, M. (2015). Head Trauma with or without Mild Brain Injury Increases the Risk of Future Traumatic Death: A Controlled Prospective 15-Year Follow-Up Study. Journal of Neurotrauma, 32(20), 1579-1583.

Davenport, N., Lim, K., & Sponheim, S. (2015). White matter abnormalities associated with military PTSD in the context of blast TBI. Human Brain Mapping, 36(3), 1053-1064.

Tanriverdi, F., Schneider, H., Aimaretti, G., Masel, B., Casanueva, F., & Kelestimur, F. (2015). Pituitary Dysfunction After Traumatic Brain Injury: A Clinical and Pathophysiological Approach. Endocrine Reviews, 36(3), 305-342.

Ioachimescu, A., Hampstead, G., Moore, B., Burgess, M., & Phillips, A. (2015). Growth hormone deficiency after mild combat-related traumatic brain injury. Pituitary, 18(4), 535-541.

Raj, S., Wade, S., Cassedy, A., Taylor, H., Stancin, T., Brown, T., & Kirkwood, M. (2014). Parent Psychological Functioning and Communication Predict Externalizing Behavior Problems After Pediatric Traumatic Brain Injury. Journal of Pediatric Psychology, 39(1), 84-95.

Misra, S., & Mohanty, D. (2017). Psychobiotics: A new approach for treating mental illness? Critical Reviews in Food Science and Nutrition, 1-7.

Koek, Roach, Athanasiou, Van 'T Wout-Frank, & Philip. (2019). Neuromodulatory treatments for post-traumatic stress disorder (PTSD). Progress in Neuropsychopharmacology & Biological Psychiatry, 92, 148-160.

Mathias, & Alvaro. (2012). Prevalence of sleep disturbances, disorders, and problems following traumatic brain injury: A meta-analysis. Sleep Medicine, 13(7), 898-905.

Ouellet, Beaulieu-Bonneau, & Morin. (2015). Sleep-wake disturbances after traumatic brain injury. The Lancet Neurology, 14(7), 746-757.

Duclos, C., Beauregard, M., Bottari, C., Quellet, M., & Gosselin, N. (2015). The impact of poor sleep on cognition and activities of daily living after traumatic brain injury: A review. Australian Occupational Therapy Journal, 62(1), 2-12.

Mollayeva, Tatyana, Mollayeva, Shirin, Pacheco, Nicole, D'souza, Andrea, & Colantonio, Angela. (2019). The course and prognostic factors of cognitive outcomes after traumatic brain injury: A systematic review and meta-analysis. Neuroscience and Biobehavioral Reviews, 99, 198-250.

Macera, C., Aralis, H., Rauh, M., & Macgregor, A. (2013). Do sleep problems mediate the relationship between traumatic brain injury and development of mental health symptoms after deployment? Sleep, 36(1), 83-90.

Johansson, B., Wentzel, A., Andréll, P., Odenstedt, J., Mannheimer, C., & Rönnbäck, L. (2014). Evaluation of dosage, safety and effects of methylphenidate on post-traumatic brain injury symptoms with a focus on mental fatigue and pain. Brain Injury, 28(3), 304-310.

Sullivan-Tibbs, M., Thompson, P., Nugent, W., & Baker, J. (2019). Sleep disturbances and suicide—New battles for veterans of U.S. wars in Afghanistan and Iraq: A retrospective review. Social Work in Mental Health, 17(2), 222-236.

Baumann, C., Bassetti, C., Valko, P., Haybaeck, J., Keller, M., Clark, E., . . . Scammell, T. (2009). Loss of hypocretin (orexin) neurons with traumatic brain injury. Annals of Neurology, 66(4), 555-559.

De La Rue-Evans, L., Nesbitt, K., & Oka, R. (2013). Sleep Hygiene Program Implementation in Patients with Traumatic Brain Injury. Rehabilitation Nursing, 38(1), 2-10.

# Questions? Thank you BrainSTEPS

