



# **The Role of the SLP in Multidisciplinary Concussion Management for Adolescents Experiencing Prolonged Concussion Symptoms (PCS)**

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# Disclosures

## **Financial Relationships:**

- Third-year doctoral student at the University of Oregon
- Maintains a current internal grant from UO on the development of a virtual concussion clinic

## **Non-Financial Relationships:**

- ASHA member

# Learning Objectives

1. Identify the required multidisciplinary practitioners for effective and coordinated concussion management.
2. Describe the models for coordinating integrated care in different contexts including school-based coordination and medical-school coordinated communication.
3. Describe the range of available SLP-delivered treatment options to address ongoing symptoms disrupting return to learn, play, and community function.



# Epidemiology

1.6-3.8 million annual concussions in U.S.

Estimated 300,000 SRC annually in U.S.

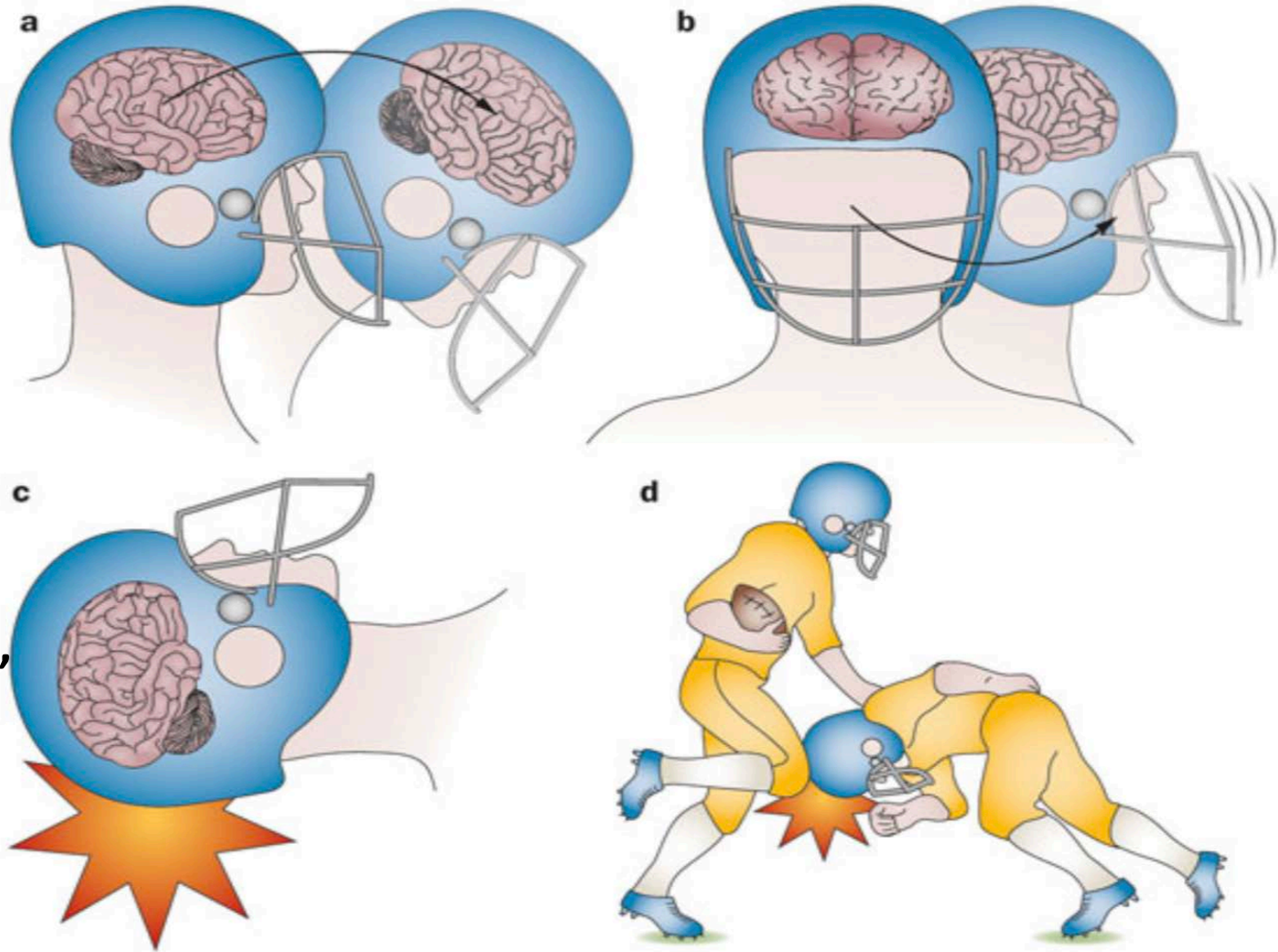
SRC and MVA most common causes ages 15-24

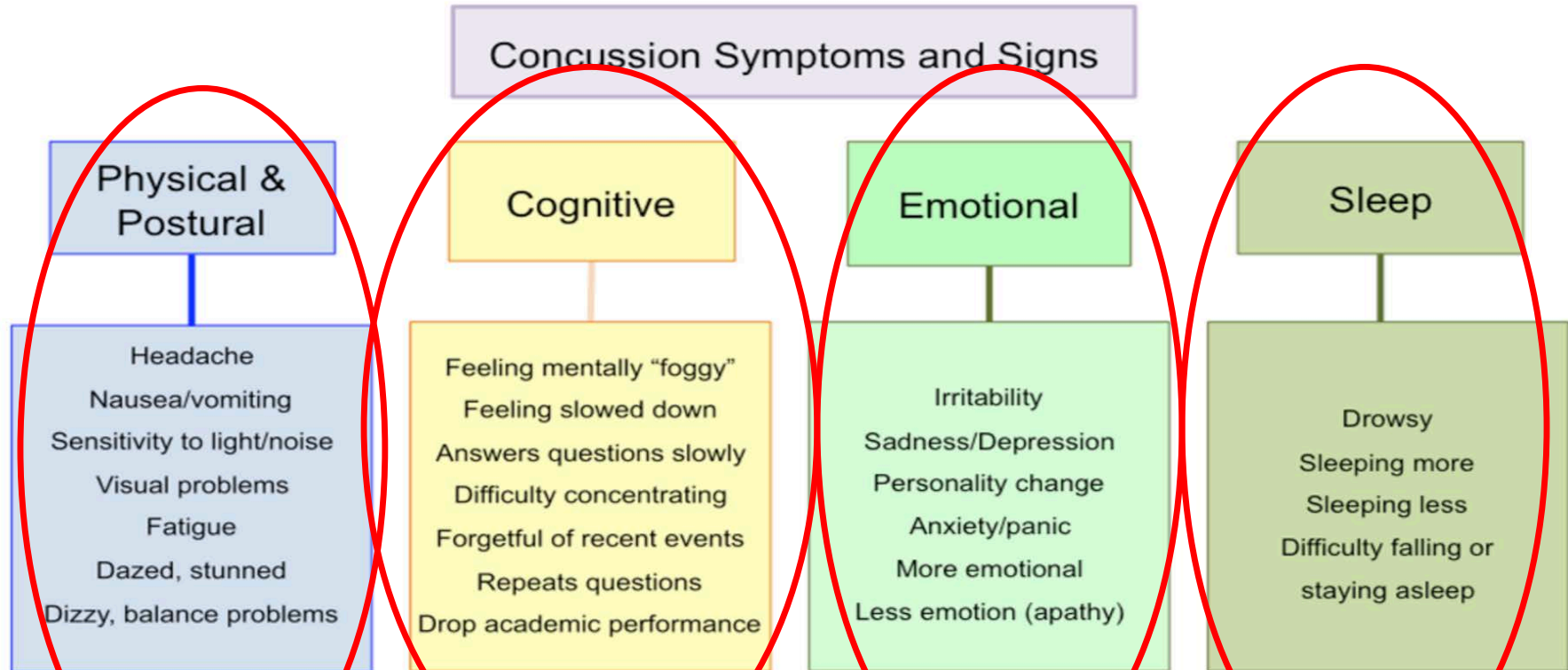
(Marar, McIlvain, Fields, & Comstock, 2012)  
(Giza & Kutcher, 2014)  
(Gonzalez & Walker, 2011)



# Definition:

The application of biomechanical force to the head and/or neck via linear and/or rotational acceleration that leads to observable changes in cognitive, somatic, and neurobehavioral functioning





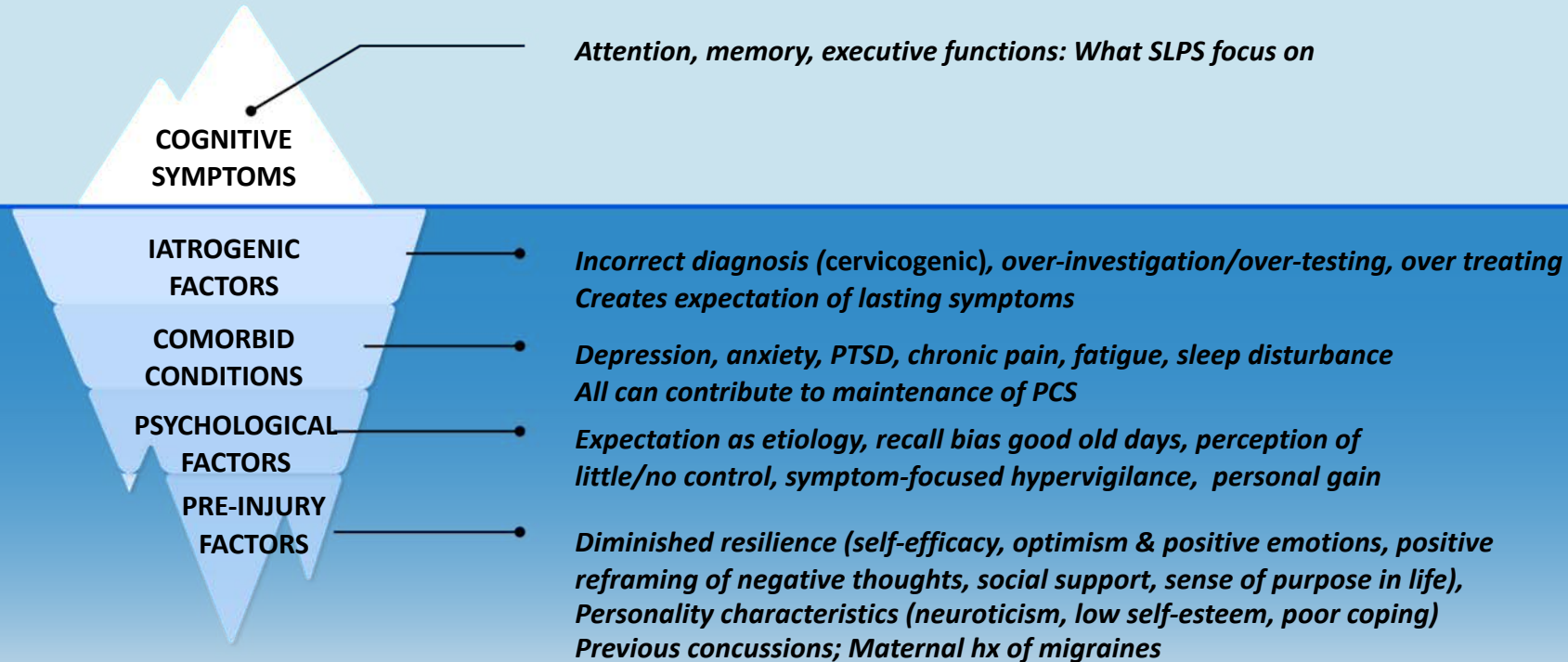
**Figure 1**  
Post-concussive signs and symptoms. Physical, cognitive, emotional and sleep signs and symptoms potentially present after sustaining a concussion.



## PCS Defined

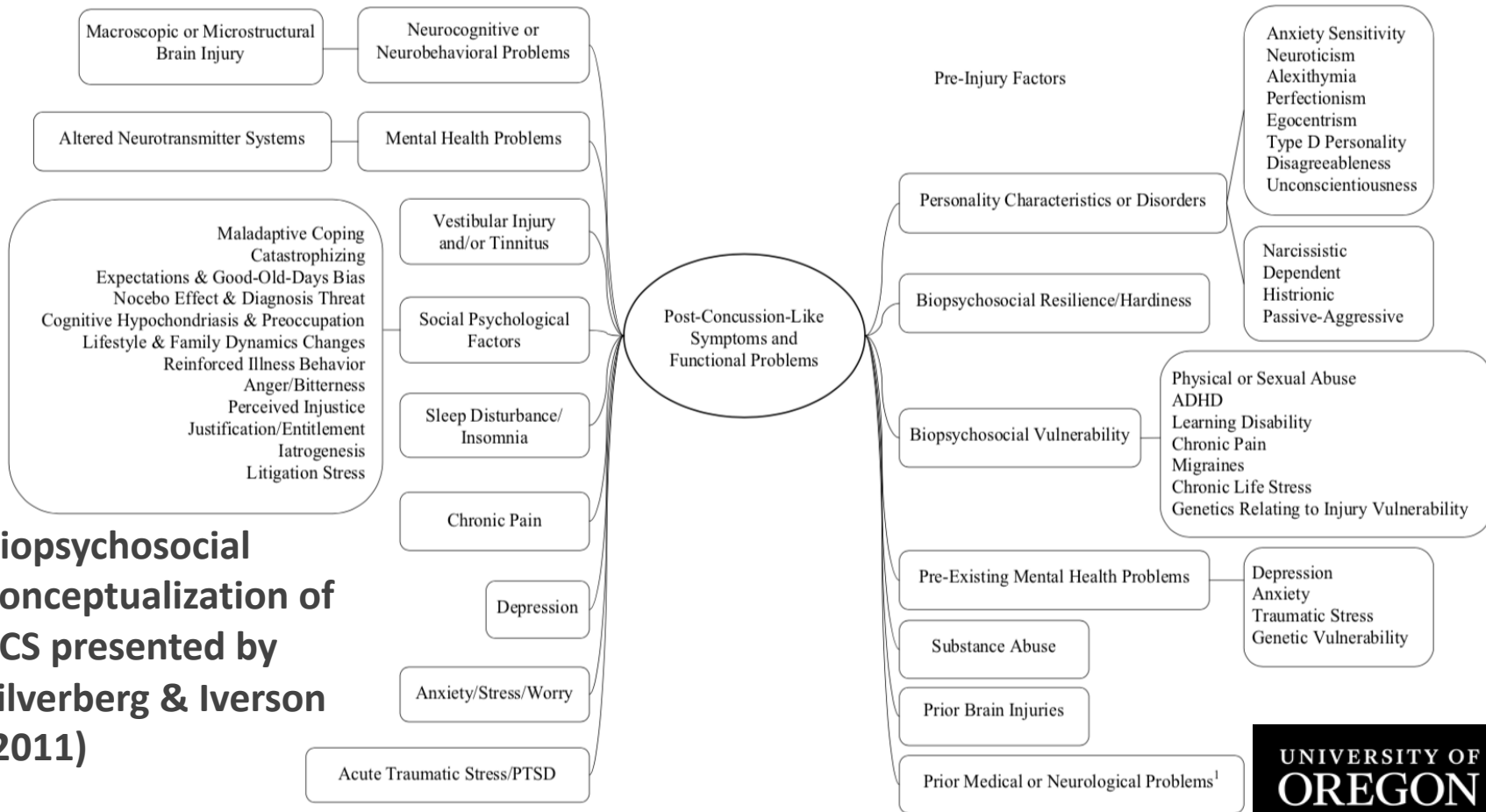
- Occurs in 10-15% of the 1.6-3.8 million annual concussion cases
- Shift in literature to use the term “Prolonged Concussion Symptoms” instead of “Post Concussion Syndrome”
- General consensus between DSM-IV and ICD-10 in diagnostic criteria of PCS
- Defined as the presence of three or more symptoms for at least three months following the injury

# There are many mediators of cognitive symptoms responsible for persistent effects



**Our interventions must address the key issues beneath the surface**





## Pre-Injury

### Individual factors:

- Genetics
- Development
- Social
- Psychological
- History of previous concussion

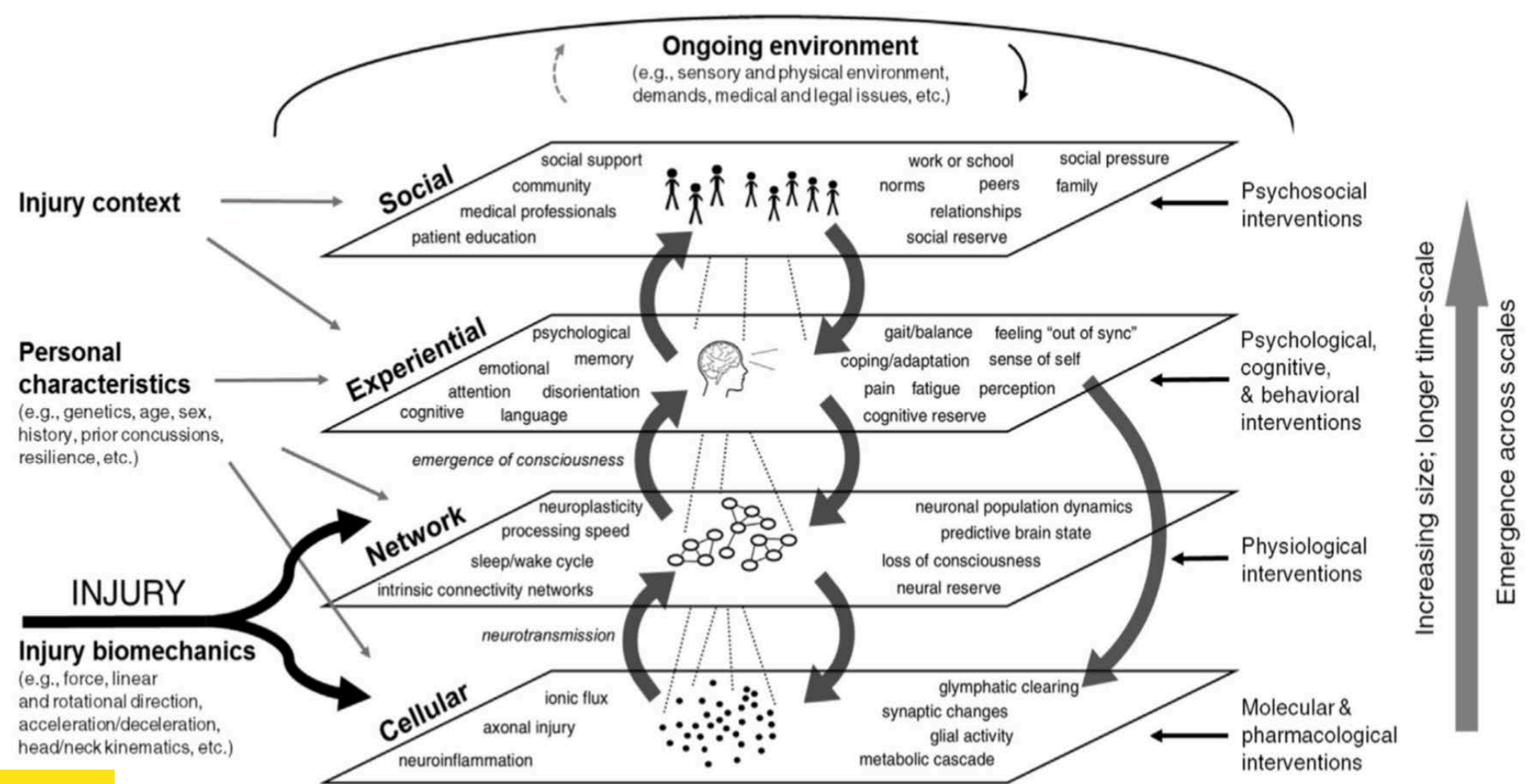
## Injury Related

- Alteration of brain physiology
- Symptom severity
- Context of injury

## Post-Injury 3 – 12+ Months

- Psychological response to injury
- Coping skills
- Nocebo effect
- Iatrogenic factors
- Misattribution





(Kenzie et al., 2017)





# SILOED Healthcare & Educational Supports Do Not Work



## Slocum Orthopedics – Dr. Michael Koester

- Medical evaluation
- ImPACT testing
- Symptom evaluation
- Identification of risk factors

### Physical Therapy

(Cooperative Performance and Rehabilitation)

- Vestibular rehabilitation

## Slocum Orthopedics – Dr. Ryann Watson-Stites

- Neuropsychological testing
- Symptom evaluation
- Identification of risk factors
- Triage

### Cognitive Rehab (HEDCO)

- Learning supports
- Cognitive strategies
- Goal setting

### School Coordination (CBIRT)

- School education
- Accommodations
- 504Plan/IEP oversight

### Mental Health (Strong Behavioral Health)

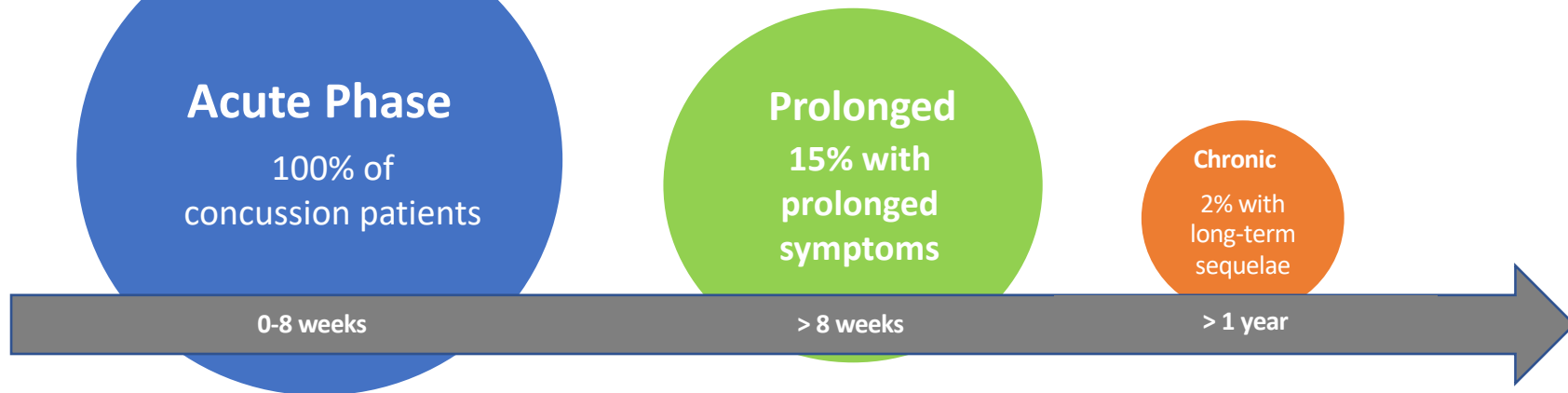
- Cognitive Behavioral Therapy to address:
- Anxiety/depression
  - Pain management
  - Sleep support

### Neurology

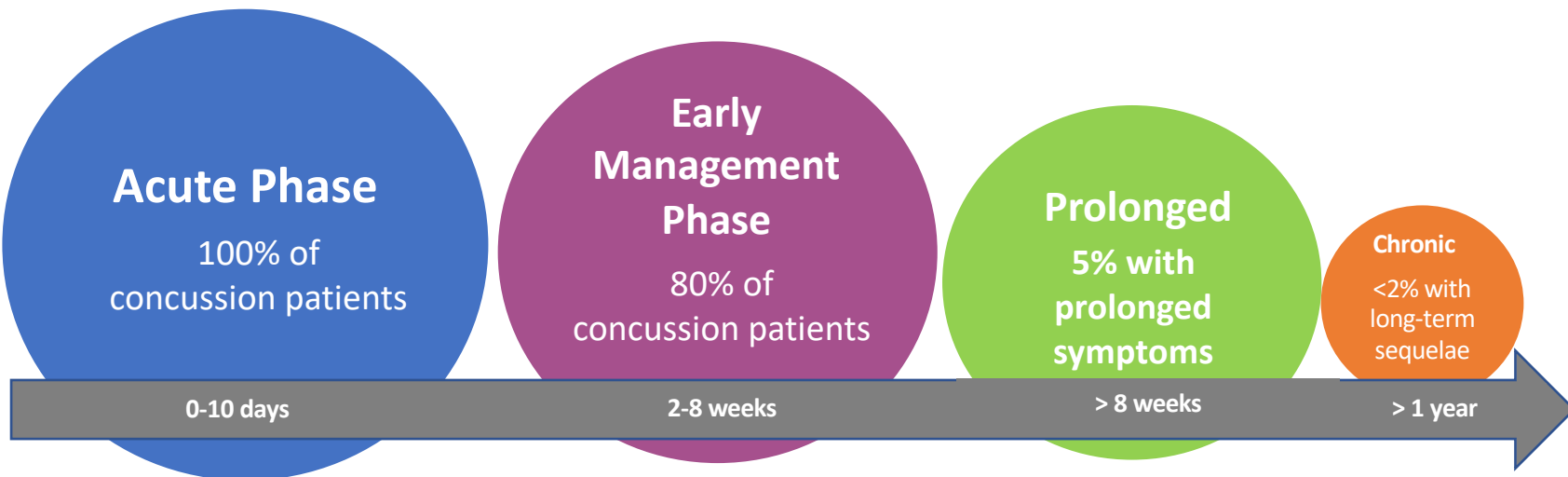
- Chronic symptom management
- Headache management



NOW



Our Goal



**Requirements for an integrated, coordinated team:**

- Designated lead
- Range of necessary disciplines
- Providers interested in concussion
- Shared consent
- System for reviewing progress



# How SLPs can Treat PCS in Adolescents



**Literature sources on concussion management**



**Review of retrospective case series on adolescents with PCS**



# Literature Sources for Adolescent Concussion Management

## Four Specific Sources:

1. Position statements on school concussion management
2. Neuropsychology treatment literature
3. Adult cognitive rehabilitation delivered by SLPs
4. Pediatric cognitive rehabilitation delivered by SLPs



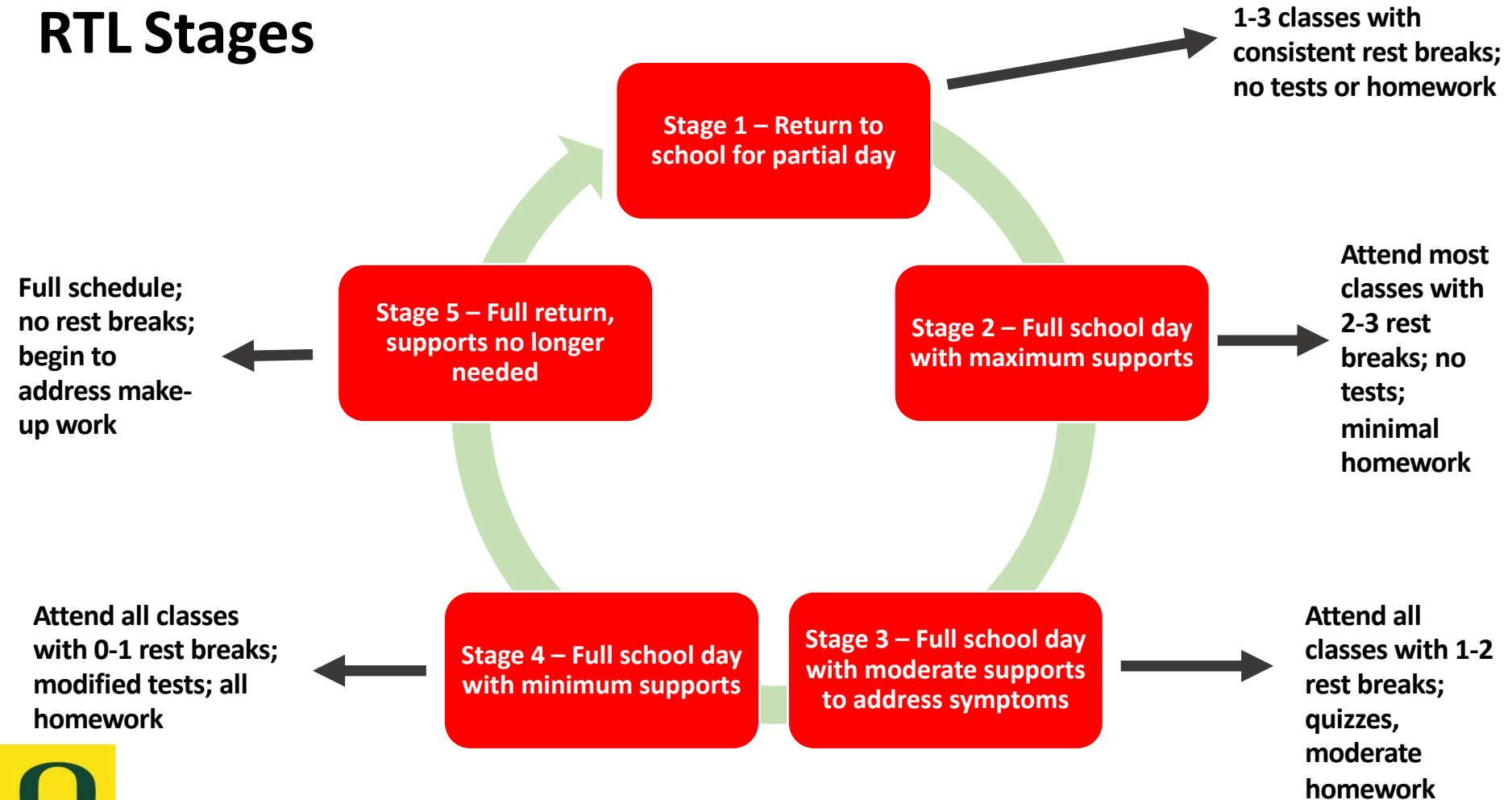
# 1. Position Statements on School Concussion Management

## Return-to-Learn (RTL) Guidelines

- **Gradual return to activity** (Dachtyl & Morales, 2017; Gioia, 2016; Halstead et al., 2013; Hossler et al., 2014; McAvoy et al., 2018)
- **Avoid total cognitive rest** (Dachtyl & Morales, 2017; Halstead et al., 2013; Hossler et al., 2014)
- **Early identification and implementation of academic accommodations and monitoring of symptom resolution** (Brown, O'Brien, Knollman-Porter, & Wallace, 2019; Dachtyl & Morales, 2017; Gioia, 2016; Halstead et al., 2013; Hossler et al., 2014; McAvoy et al., 2018)



# RTL Stages



Gioia (2016)



**Step 1. Total rest.**

- No mental exertion (computer, texting, video games, or homework), stay at home, no driving.

**Step 2. Light mental activity.**

- Up to 30 minutes of mental exertion, but no prolonged concentration, stay at home, no driving.
- Progress to next level when able to handle up to 30 minutes of mental exertion without worsening of symptoms.

**Step 3. Part-time School.**

- Maximum accommodations (shortened day/schedule, built-in breaks, provide quiet place for mental rest, no significant classroom or standardized testing, modify rather than postpone academics, provide extra time, extra help, and modified assignments).
- Progress to next level when able to handle 30–40 minutes of mental exertion without worsening of symptoms.

**Step 4. Part-time School.**

- Moderate accommodations (no standardized testing, modified classroom testing, moderate decrease of extra time, help, and modification of assignments).
- Progress to next level when able to handle 60 minutes of mental exertion without worsening of symptoms.

**Step 5. Full-time School.**

- Minimal accommodations (no standardized testing, but routine testing ok; continued decrease of extra time, help, and modification of assignments; may require more supports in academically challenging subjects).
- Progress to next level when able to handle all class periods in succession without worsening of symptoms AND medical clearance for full return to academics.

**Step 6. Full-time School.**

- Full academics with no accommodations (attends all classes, full homework).



# 1. Position Statements on School Concussion Management

## Multidisciplinary Participation

- **Communication between medical and school personnel** (Brown et al., 2019; Gioia, 2016; Halstead et al., 2013; Knollman-Porter, Constantinidou, Beardslee, & Dailey, 2019; Knollman-Porter, Constantinidou, & Hutchinson Marron, 2014; McAvoy et al., 2018)
- **Staff education on nature of concussion and methods to support students during recovery** (Dachtly & Morales, 2017; Gioia et al., 2016; Romm et al., 2018)
- **SLPs have been identified to fulfill various roles on concussion management teams** (Brown et al., 2019; Dachtly & Morales, 2017; Hardin & Kelly, 2019; Ketcham et al., 2017; Knollman-Porter et al., 2019, 2014; Salvatore & Fjordbak, 2011)



## 2. Neuropsychology Treatment Literature

### TREATMENT COMPONENTS

- **Psychoeducation emphasizing support and reassurance for recovery** (McNally et al., 2018; Ponsford et al., 2001; Scheenen, Visser-Keizer, Van Der Naalt, & Spikman, 2017)
- **Areas to target:**
  - Behavioral health
  - Increase in activity
  - Cognitive restructuring
  - Coping skills

### IATROGENESIS

- **Facilitating the expectation or context for illness** (Kirkwood, Peterson, Connery, Baker, & Forster, 2016)
  - Over-testing
  - Pathologizing
  - “Identity as disability”



### 3. Adult Cognitive Rehabilitation Delivered by SLPs

Population	Cognitive Target	Therapeutic Approach	Outcome Measures
<ul style="list-style-type: none"><li>• Adult mTBI</li></ul>	<ul style="list-style-type: none"><li>• Working memory</li><li>• Executive function</li></ul>	<ul style="list-style-type: none"><li>• MSI</li><li>• ATC</li><li>• Psycho-education</li></ul>	<ul style="list-style-type: none"><li>• D-KEFS</li><li>• BRIEF</li><li>• KBCI</li></ul>

(Cooper et al., 2016; Sohlberg et al., 2014; Tiersky et al., 2005; Trebla-Barna et al., 2016; Twamley et al., 2014; Williams-Butler & Cantu, 2019)



## 4. Pediatric Cognitive Rehabilitation Delivered by SLPs

Population	Cognitive Target	Therapeutic Approach	Outcome Measures
<ul style="list-style-type: none"><li>• Pediatric moderate to severe TBI</li><li>• Pediatric post-cancer treatment</li></ul>	<ul style="list-style-type: none"><li>• Attention</li><li>• Working memory</li><li>• Executive function</li></ul>	<ul style="list-style-type: none"><li>• Combination of drills and MSI</li></ul>	<ul style="list-style-type: none"><li>• Standardized assessments of speech, language, and cognition</li></ul>

(Laatsch et al., 2007; Limond & Leeke, 2005)





# **Identifying Key Therapy Ingredients SLPs Need to Know to Help Students with Persistent Cognitive Effects Return to Learn after Concussion: A Retrospective Case Series Analysis**

Wright, Sohlberg, Watson-Stites, & McCart (2019)



# Retrospective Case Series

- Used Clinical Data Mining
- 15 students ages 13-18 with PCS
- Data Extracted in Four Categories:
  - Student characteristics
  - SLP Treatment Parameters
  - Clinical Outcomes
  - Nature of Multidisciplinary Treatment Communication

We wanted to explore RTL supports in the absence of a co-located multidisciplinary clinic



# Context

- University Training Clinic: Graduate students supervised by one of four SLPs
- Students with concussion referred by pediatric neuropsychologist
- Loose concussion management team
  - Pediatric neuropsychologist was the lead
  - Provided initial testing and psychoeducation
  - Activated relevant practitioners
  - Monthly case review meeting that could be attended by phone



# Student Characteristics

- 8 Female; 7 male
- Age 12-18 years
- 9 sports injuries; 3 falls, 2 MVA, 1 assault
- Modal duration of time until we treated—4 months
- All students considered chronic (longer than 3 months)
- Number of previous concussions: 10 had at least 1
- Psychological history: 5 anxiety or depression



# Student Characteristics Cont.

- Primary symptoms
  - 12 reported symptoms in all three domains (Cognitive, Somatic, and Psychological)
- Academic Supports
  - 3 received initial academic accommodations
  - 9 placed on 504 Plans
  - 2 determined eligible for an IEP



# SLP TREATMENT

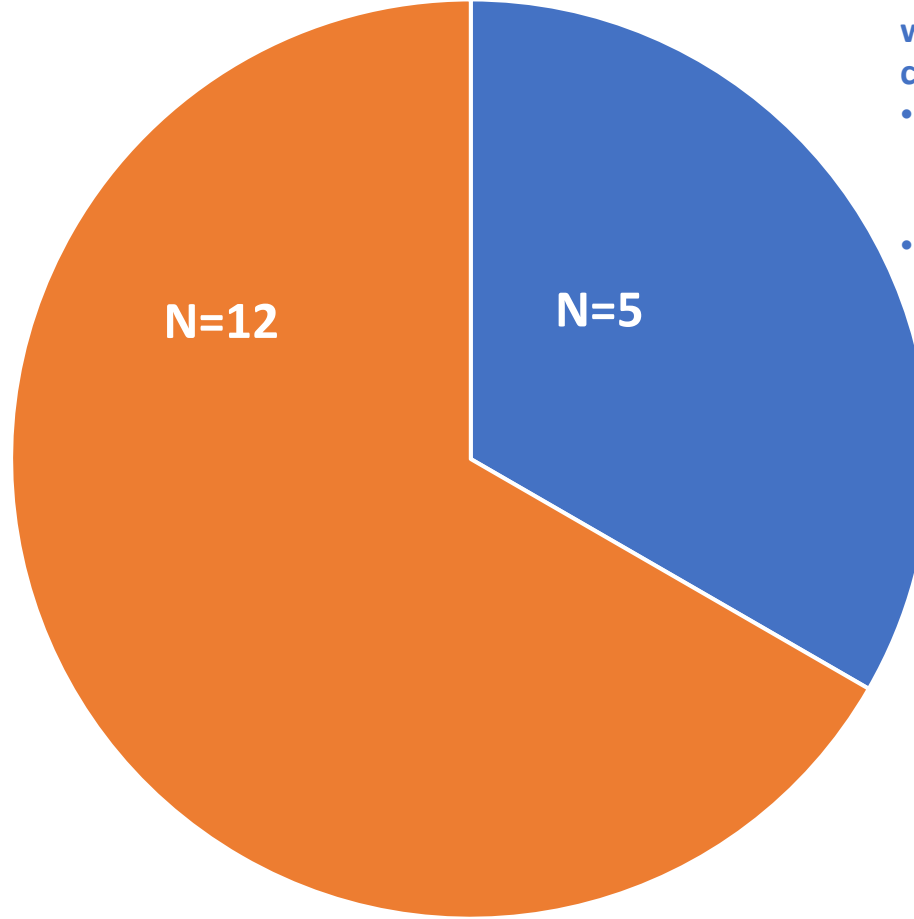
- Dosage
  - Average: 9 session
  - Range: 4-19
- Therapy Goals
- Therapy Approach



**Academic goals for students with EF (self-regulation) concerns:**

- Increased assignment completion (N=5)
- Improved Grades (n=4)
- Increased Attendance (N=2)
- Reduced screen time compared to assignment completion (N=1)

**Primary Cognitive Targets**



**Academic goals for students with attention/WM concerns:**

- Increased retention of lecture material and verbal instructions (n=4)
- Increased reading comprehension (n=1)



# Therapy Approach

## Cognitive Symptom Management

**Metacognitive  
Strategy Instruction  
(N=11)**

**Assistive Technology  
for Cognition  
(N=8)**

**Attention Training  
(N=1)**

## Psych Symptom Management

**Psychoeducation  
(N=10)**

## Somatic Symptom Management

**Symptom Tracking for  
trends and triggers  
(N=3)**

**Sleep Hygiene  
Protocol (N=1)**





# Goal and Therapy Selection Process

- Review of cognitive testing and school records
- Use of the three target questions:
  - What do you want to change about school right now?
  - What do you think is getting in the way?
  - What aspects of school are going well?



# Specific Therapy Activities

## • Types of MSI

- Internal self talk/verbal mediation to reauditorize information (N=6)
- Reading comprehension/retention strategies (N=4)
- Prediction (N=2)
- Task planning sequence (N=2)
- Test study strategies (N=1)
- Visualization (N=1)
- Mood regulation (N=1)

## • Types of ATC

- Paper planner/Calendar app (N=5)
- Task initiation chart (N=1)
- Smart pen for lectures (N=1)
- Apple iOS screen time feature corresponding to homework completion (N=1)



# Psychoeducation Themes

- Expectation for improvement (N=7)
- Increasing understanding about relationship between anxiety and cognitive symptoms (N=6)
- Increasing understanding about relationship between sleep and cognitive symptoms (N=2)
- Emphasizing importance of reactivation to increase activity level (N=6)



# Clinical Outcomes

## PRIMARY SESSION MEASUREMENT

- Fluency and accuracy with steps to use strategy and devices
- Reflection of trends and triggers

## TYPES OF ACADEMIC OUTCOMES

- GPA
- Attendance
- Number of missing assignments



# Overall Outcome Measurement

- **Goal Attainment Scaling**

- goal hierarchies for homework completion (N=5)
- 2 goal hierarchies for attention/retention of school material (N=2)
- 1 goal hierarchy for school attendance (N=1)
- *All achieved expected progress or better*

- **Rating Scales**

- Perceived usage and effectiveness of tools and strategies (N=4)
- *3 students had high ratings but didn't necessarily translate into academic outcomes*

- **Data from school/parent/tool**

- Attendance (N=2)
- Grades (N=4)
- IOS screen tracker information (N=1)
- *5 students met goal levels*

- **Pre-Test/Post-test**

- Reading comprehension pre/post (N=1)
- Headache Impact Test (N=1)
- *Both students showed significant changes*



# Multidisciplinary Communication

- 7 types of practitioners in 6 locations
- 7 high schools, 2 middle schools, 3 districts
- Most frequent provider communication was with neuropsychologist, educational liaison, and clinical psychologist
- Least communication was with PT
- Examples of positive effects of team
  - “It’s ok if your headache increases a bit; it won’t harm you”
  - Parent support based on psychologist’s concern parent was inadvertently receiving psychological benefits for child staying home



# GAS Example Measuring improved grades resulting from ATC training

Goal	Improve my grades by inputting my assignments into my Google Calendar
+2 Much more than expected	I will input all assignment deadlines into the Google Calendar app 5 days out of the week
+1 More than expected	I will input all assignment deadlines into the Google Calendar app 4 days out of the week
0 Expected	I will input all assignment deadlines into the Google Calendar app 3 days out of the week
-1 Baseline	I will input all assignment deadlines into the Google Calendar app 2 days out of the week
-2 Decline	I will input all assignment deadlines into the Google Calendar app 1 day out of the week
Measurement	SLP and student reviewed the Google Calendar each week and determined progress.



# GAS Measuring Use of Lecture Note/Review Strategy

Goal	Increase my ability to recall classroom content in geometry class
+2 Much more than expected	I remembered geometry content from one day to the next 4 days this week
+1 More than expected	I remembered geometry content from one day to the next 3 days this week
0 Expected	I remembered geometry content from one day to the next 2 days this week
-1 Baseline	I remembered geometry content from one day to the next 1 days this week
-2 Decline	I remembered geometry content from one day to the next 0 days this week
Measurement	Student documented whether she could recall specific content from the previous lecture at the beginning of each class.





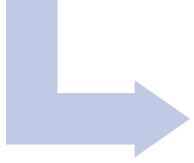
# Clinical Pathways to Treating Prolonged Cognitive Symptoms

- Case examples of applying the pathway from theory to practice

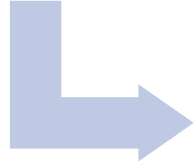


# Pathway Components

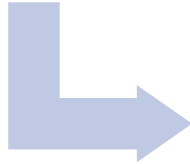
**Motivational  
Interviewing to  
Develop Goals**



**Psychoeducation**



**Selection of  
Therapeutic  
Approach**



**Measurement Plan**



**Outcome**

# Case 1

## DEMOGRAPHICS

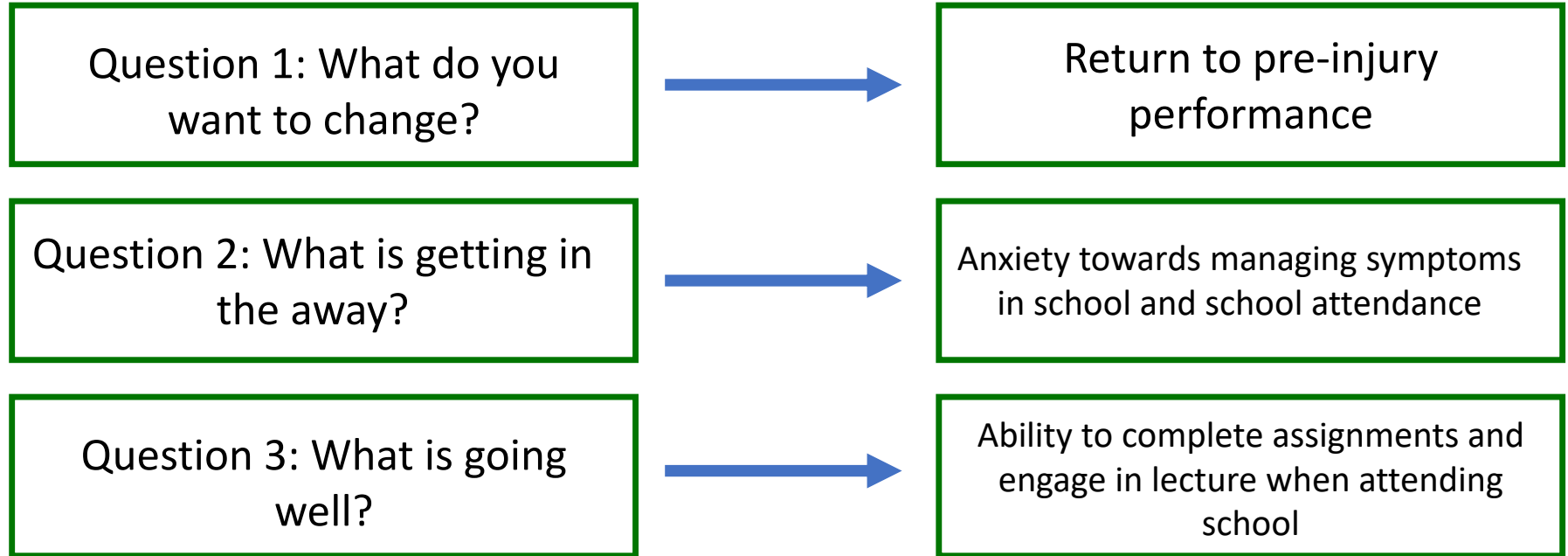
- 16 year old male
- Sustained concussion in a car accident
- No prior concussions
- No history of depression/anxiety

## PROLONGED SYMPTOMS

- Headaches
- Difficulty sleeping
- Self-regulation (manifested through poor school attendance)
- Anxiety towards symptoms and recovery



# Step 1 – Motivational Interviewing



# Step 2 – Psychoeducation

## Common Psychoeducation Themes Individualized to Student

1. Establish the expectation of recovery
2. Importance of developing healthy sleep habits and a sleep routine
3. Importance of reactivation



# Step 3 – Selection of Therapeutic Approach

## Considerations:

1. What cognitive target does the student need to improve?
2. What is the student's motivation to adhere to therapeutic intervention?

1. Student has strong self-awareness but needs to improve self-regulation skills
2. Motivated to improve but continues to "get stuck"

Approach: MSI  
(internal self-talk and self-monitoring)

Rationale:  
Appropriate to target self-regulation and provides foundation for student to continuously reflect on performance

# Step 4 – Measurement Plan

Goal	Increase the number of hours I attend school each day
+2 Much more than expected	I will attend school for 5 hours per day, 5 days per week
+1 More than expected	I will attend school for 4 hours per day, 5 days per week
0 Expected	I will attend school for 3 hours per day, 5 days per week
-1 Baseline	I will attend school for 2 hours per day, 5 days per week
-2 Decline	I will attend school for 1 hours per day, 5 days per week
Measurement	Parent and student reported data to the SLP each week. School reported data to SLP once per month.



## Step 5 – Outcome

- Achieved Level 0 on GAS – expected level of outcome
- Set to return to regular academic schedule 19-20 school year
- Discharged following goal completion





# Case 2

## DEMOGRAPHICS

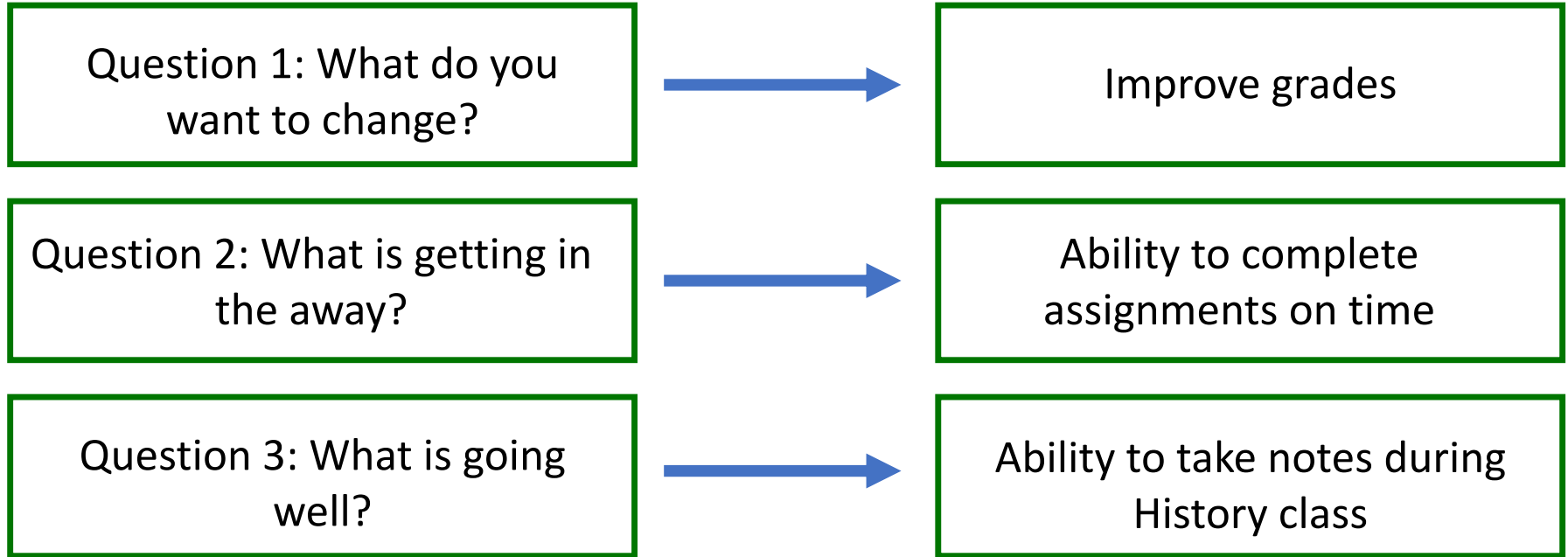
- 16 year old male
- Sustained concussion playing football
- 2 previous concussions
- History of depression/anxiety

## PROLONGED SYMPTOMS

- Headaches
- Fatigue
- Self-regulation (manifested through decrease in grades)
- Diagnosed with anxiety pre-injury – exacerbated following concussion



# Step 1 – Motivational Interviewing



# Step 2 – Psychoeducation

## Common Psychoeducation Themes Individualized to Student

1. Establish the expectation of recovery
2. Relationship between ongoing anxiety symptoms and how they impact cognitive skills
3. Decision to return to team sport or not



# Step 3 – Selection of Therapeutic Approach

## Considerations:

1. What cognitive target does the student need to improve?
2. What is the student's motivation to adhere to therapeutic intervention?

1. Needs to improve self-regulation and organization skills to better manage school assignments
2. Expresses motivation to improve but quick to deflect accountability

Approach: ATC  
(phone calendar with reminders)

Rationale:  
Appropriate to target self-regulation, organization, and time management skills

# Step 4 – Measurement Plan

Goal	Improve my grades by inputting my assignments into my Google Calendar
+2 Much more than expected	I will input all assignment deadlines into the Google Calendar app 5 days out of the week
+1 More than expected	I will input all assignment deadlines into the Google Calendar app 4 days out of the week
0 Expected	I will input all assignment deadlines into the Google Calendar app 3 days out of the week
-1 Baseline	I will input all assignment deadlines into the Google Calendar app 2 days out of the week
-2 Decline	I will input all assignment deadlines into the Google Calendar app 1 day out of the week
Measurement	SLP and student reviewed the Google Calendar each week and determined progress.



## Step 5 – Outcome

- Achieved Level 0 on GAS – expected level of outcome
- Increased GPA from 1.83 to 2.17 pre/post treatment
- Discharged following goal completion



# What Clinical Pathways Should Include

1. Collaborative goal setting through motivational interviewing to identify challenges and develop meaningful goals for the student
2. Individualized psychoeducation to support the individual's somatic or psychological symptoms
3. Toolbox with range of cognitive strategies and/or ATC
4. Measurement Plan
5. Outcome

Contact: Jim Wright – [jwright16@uoregon.edu](mailto:jwright16@uoregon.edu)



# Headache Psychoeducation handout

## Headache Management and Prevention (9 Steps)

### 1. Dietary Changes

- Eat regular meals.
- Try not to miss meals, meaning >5 hours during the day >13 hours overnight.

### 2. Learn Possible Triggers

- Potential food triggers: caffeine, cheddar cheese, chocolate, red meat, dairy products, vinegar, bacon, hotdogs, pepperoni, bologna, deli meats, smoked fish, sausages.
- Other potential triggers: over-exertion, stress, loud noise, bright lights, intense emotions, excitement, weather changes, strong odors, smoke, chemical fumes, motion or travel, medication, hormone changes, & monthly cycles.

### 3. Drink Enough Water

- Remember to stay hydrated and drink water throughout the day.

### 4. Get Enough Rest

- Too much sleep during the day (naps) and too little sleep at night may trigger headaches. Develop and keep a bedtime routine.

### 5. Maintain your Routine

- Maintain a consistent daily routine.

### 6. Exercise

- Get at least 30 minutes of light physical activity every day.

### 7. Headache Diary

- Maintain a daily headache diary to record the time, frequency, severity, triggers, and to monitor treatments.

### 8. Headache Medications

- Consult your physician on the following over-the-counter headache medications:
  - Migrelief (B2 + Feverfew) and Magnesium
  - Potassium-Magnesium Aspartate (GNC Brand) 250 mg tablets
  - Vitamin B2 (riboflavin) 100mg tablets
  - Magnesium Oxide 400mg tablets
  - Melatonin

### 9. Headache Medication Precautions

- Overuse of over the counter medications (acetaminophen, ibuprofen, naproxen) may result in rebound headaches.





# School Attendance Psychoeducation handout

## Tips to Improving School Attendance after Concussion (3 Steps)

### 1. Make Going to School Your Top Priority

- Try to avoid determining if you are “well enough to go to school” after you wake up.
- Instead, go to school and try to manage symptoms once you are there.
- If absolutely necessary, you can go home later.

### 2. Work Hard to Stay at School

- Once you are in school, don’t immediately head home if you experience symptoms.
- Establish a rest place for breaks – library or nurse’s office.
- Keep supplies of headache medication in school.
- Avoid negative thoughts during rest breaks.
- Stay OFF your phone while resting.

### 3. Track Your Progress

- Record your increased attendance.
- Record less frequent and shorter rest breaks.
- Remember that sometimes there will be good days and bad days, but you WILL improve.



# Sleep Hygiene Psychoeducation handout

## Sleep Hygiene (5 Steps)

### 1. Sleep Schedule

- Set a bedtime that allows for 8-9 hours of sleep/night.
- Try to go to bed and wake up at the same time every day.

### 2. Power Down Your Devices

- Adjust devices to “night shift” in the evening.
- Avoid excessive use 1-2 hours before bedtime to reduce eye strain.
- Replace device use with another activity, such as listening to music or reading, that allows your mind to rest prior to going to bed.

### 3. Reduce Stimulants

- Avoid stressful and/or stimulating activities in the late afternoon and evening – doing work, discussing work, consuming caffeine.
- Physically and mentally stimulating activities increase alertness, so if you find yourself taking your problems to bed, try writing them down and put them aside.

### 4. Exercise Early

- Exercise can help you fall asleep and sleep more soundly, but it has to be done at the right time.
- Try to exercise at least 3 hours prior to bedtime or earlier in the day.

### 5. Create a Relaxing Sleep Environment

- Limit noise with the use of earplugs or a white noise generator.
- Reduce light using blackout shades or an eye mask.
- Keep the temperature comfortably cool.
- Limit your bedroom activities to sleeping.
- Keep work materials out of your bedroom to strengthen mental association between your bedroom and sleep.



# Types of Thinking Psychoeducation handout

## Types of Thinking That Increase Stress and Worsen Concussion Recovery (7 Thinking Patterns to be Aware of and Avoid)

### 1. Black-and-White Thinking

- Viewing a problem or situation as all or nothing, one extreme or the other – *There's no way I'm getting into college after how I did on that test.*
- This type of thinking is unrealistic because life is rarely completely hopeless or absolutely fantastic – it's usually somewhere in between.

### 2. Overgeneralization

- Seeing a pattern based on a single event.
- Just because something happened once does not necessarily mean it will continue to happen in the future.
- Using words like “always”, “never”, or “nothing” are clues you may be overgeneralizing – *I'm always going to get a concussion when I play soccer.*

### 3. Personalization

- Blaming yourself or taking responsibility for something that wasn't completely your fault.

### 4. Mistaking Feelings for Facts

- Involves confusing feelings with reality – *because I feel stupid I must really be stupid.*
- Assuming that because we feel a certain way, what we think must be true – *I feel embarrassed so I must be an idiot.*

### 5. Jumping to Negative Conclusions

- Drawing negative conclusions from a situation when there is no evidence to support it – *I've been having headaches for 3 straight days, it's never going to get better.*

### 6. Catastrophizing

- Assuming a situation has been or will be a complete and total disaster – *I couldn't sleep at all last night, there's no way I get a good grade on my Algebra test today.*

### 7. Disqualifying the Positive

- Ignoring the good things that have happened or that you have done for some reason or another.
- Only paying attention to the negative things that happen and ignoring the positive.



# References

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