PSYCHOLOGICAL ASPECTS OF CONCUSSION IN CHILDREN AND ADOLESCENTS

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AGENDA

Introduction

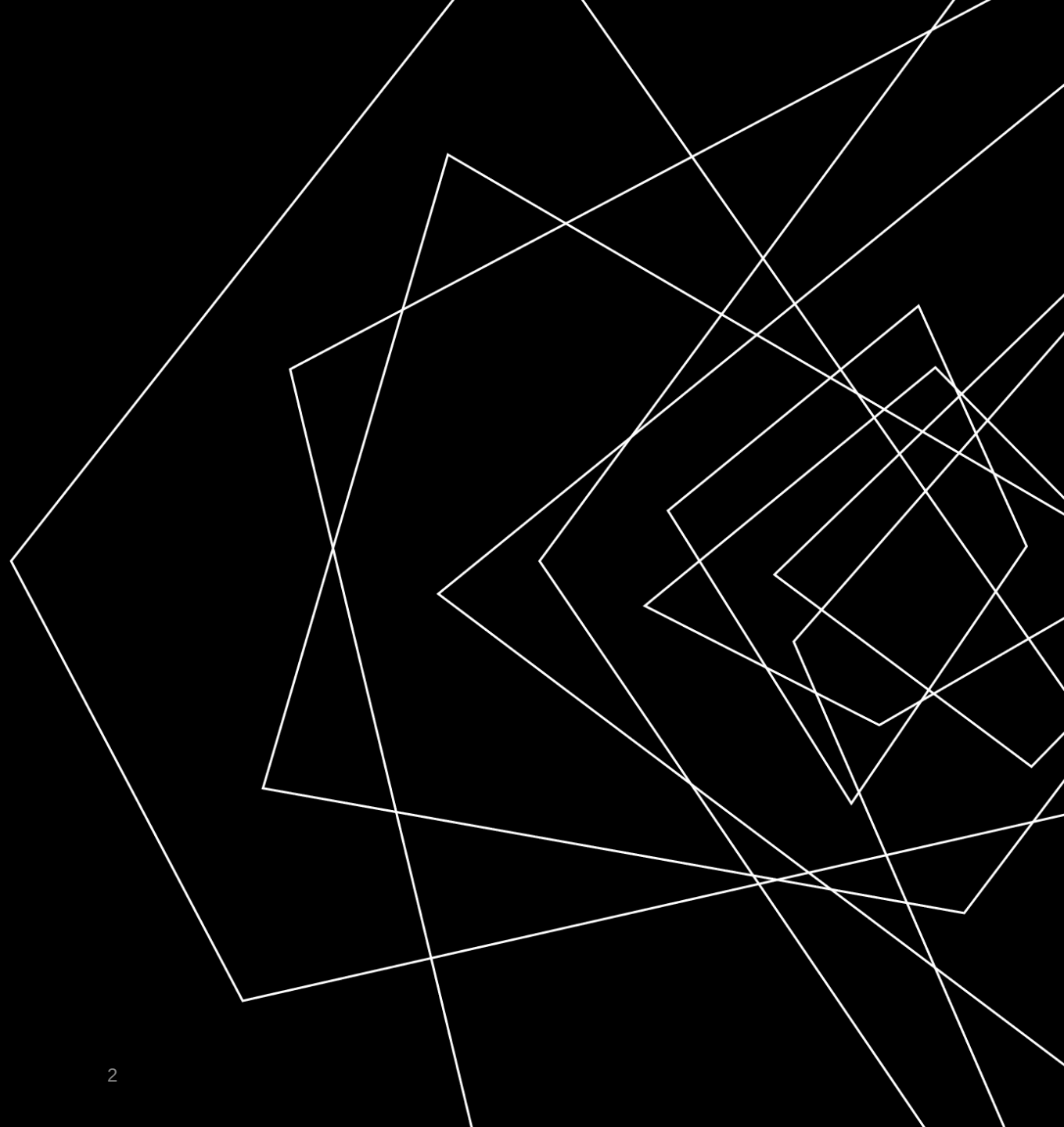
Concussions in children/adolescents

Assessment

Therapy for PPCS

School-based support

Case presentation



INTRODUCTION

Goals

Controversies

INTRODUCTION

Consensus statement

Consensus statement on concussion in sport: the 6th International Conference on Concussion in Sport–Amsterdam, October 2022

Jon S Patricios [1], Kathryn J Schneider [2], Jiri Dvorak [3], Osman Hassan Ahmed [4,5], Cheri Blauwet [6,7], Robert C Cantu, [8,9] Gavin A Davis [10,11], Ruben J Echemendia [12,13], Michael Makdissi, [14,15] Michael McNamee, [16,17] Steven Broglio [18], Carolyn A Emery [2], Nina Feddermann-Demont, [19,20] Gordon Ward Fuller [21], Christopher C Giza, [22,23] Kevin M Guskiewicz, [24] Brian Hainline [25], Grant L Iverson [26,27], Jeffrey S Kutcher, [28] John J Leddy [29], David Maddocks, [30] Geoff Manley [31], Michael McCrea [32], Laura K Purcell, [33] Margot Putukian [34], Haruhiko Sato [35], Markku P Tuominen, [36] Michael Turner [37,38], Keith Owen Yeates [39], Stanley A Herring, [40,41] Willem Meeuwisse [42]

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ABSTRACT
For over two decades, the Concussion in Sport Group has held meetings and developed five international statements on concussion in sport. This 6th statement summarises the processes and outcomes of the 6th International Conference on Concussion in Sport held in Amsterdam on 27–30 October 2022 and should be read in conjunction with the (1) methodology paper that outlines the consensus process in detail and (2) 10 systematic reviews that informed the conference outcomes. Over 3½ years, author groups conducted systematic reviews of predetermined priority topics relevant to concussion in sport. The format of the conference, expert panel meetings and workshops to revise or develop new clinical assessment tools, methodology. The purpose of this Statement is to provide a summary of the evidence and practice recommendations based on science and expert panel consensus recommendations at the time of the conference. Additional outputs of the consensus process include freely available evidence-informed tools to assist in the detection and assessment of SRC, including the Concussion Recognition Tool-6 (CRT6), Sport Concussion Assessment Tool-6 (SCAT6), Child SCAT6, Sport Concussion Office Assessment Tool-6 (SCOAT6) and Child SCOAT6. Apart from this Statement, in the interest of knowledge translation, the tools are free to distribute in their original formats.

This Statement is developed for the healthcare


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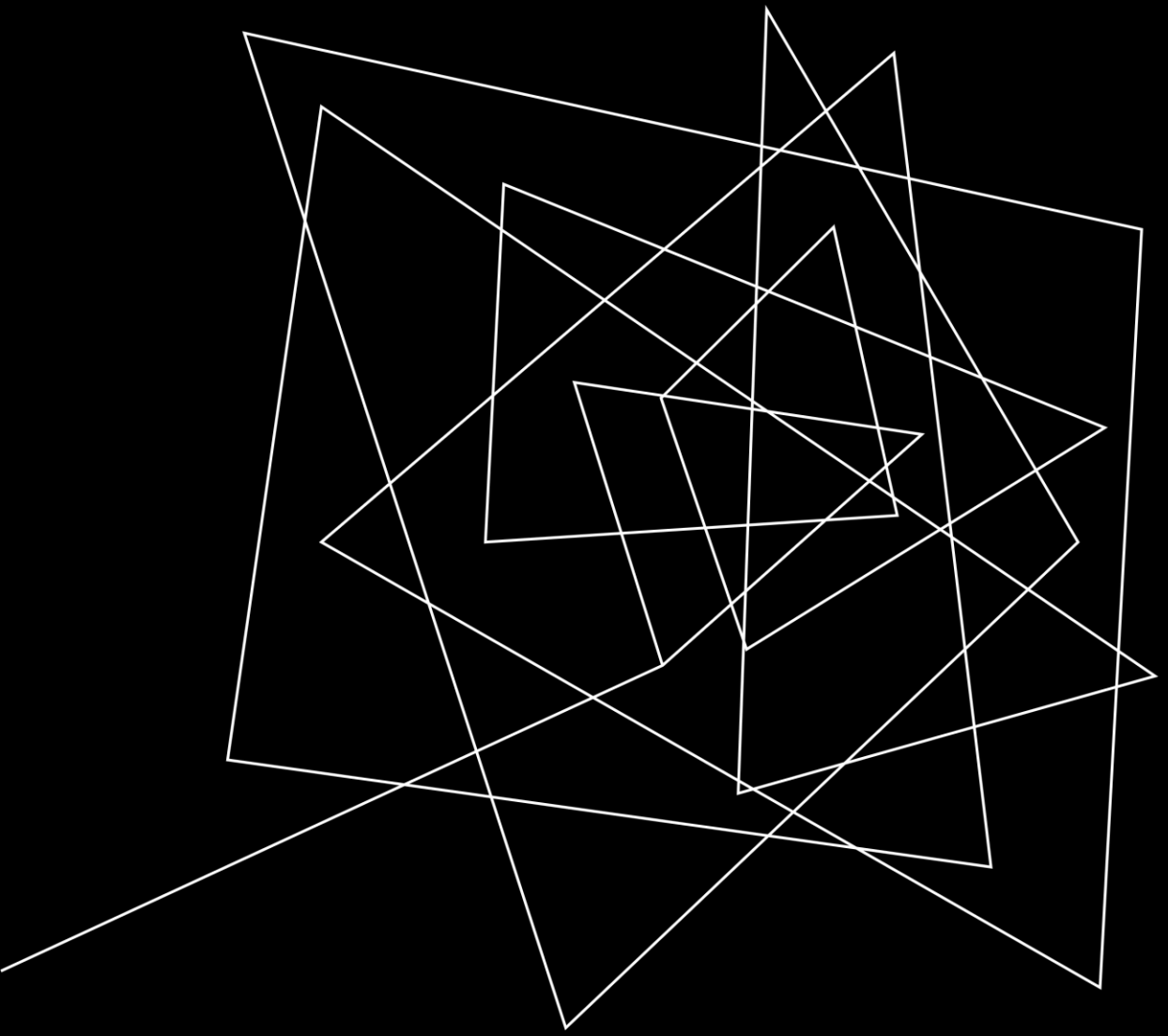
RISKS ASSOCIATED WITH NOT PLAYING SPORTS/ATHLETICS

- 66% of US high school students with mostly A's played on at least one sports team (run by their school or community groups during the 12 months before the survey), compared to only 42% of students with D/F's.
- Student's with "Higher Grades" were MORE LIKELY TO:
  - More likely to engage in physical activity for at least 60 minutes 7 days/wk
  - Play on at least 1 sports team
- Students with "High Grades" were LESS LIKELY TO:
  - Watch television for 3 or more hours per day
  - Play video games or use a computer for 3 or more hours per day
- Sports and social, psychological, and cognitive health
  - Decreased depression/anxiety, higher self esteem, cardiovascular health, life satisfaction

CDC 2024

Eime et al., 2013

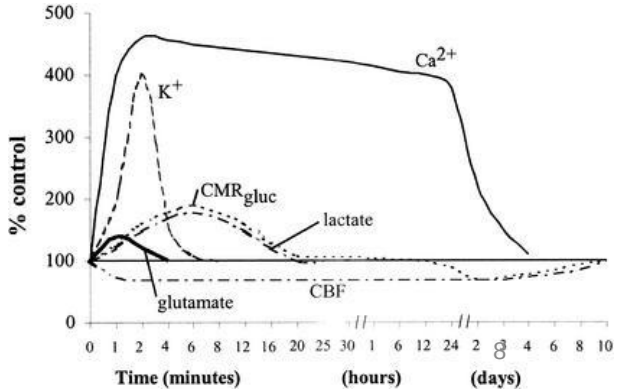


CONCUSSION IN CHILDREN/ADOLESCENTS

CONCUSSION IN CHILDREN/ADOLESCENTS

-What is a concussion?

"Traumatically induced transient disturbance of brain function and involves a complex pathophysiological process. Concussion is a subset of mild traumatic brain injury (MTBI) which is generally self-limited and at the less-severe end of the brain injury spectrum" Harmon et al., 2019



CONCUSSION IN CHILDREN/ADOLESCENTS

- **Symptoms**
  - Headache (93% of concussed HS students)
  - Nausea/vomiting
  - Balance problems
  - Double/blurred vision
  - Light sensitivity
  - Attention problems
  - Mood/behavioral change

CONCUSSION IN CHILDREN/ADOLESCENTS

-Epidemiology

- 1-1.8 million sports-related concussions in 0-18-year-olds

- >50% of concussions in high-school are NOT related to organized sports and ~20% are related to organized school sports

- 2-15% of athletes participating in organized sports will suffer a concussion during the season.

CDC, 2021

CONCUSSION IN CHILDREN/ADOLESCENTS

- **ED visits for concussion come from**
  - Bicycling, football, playground activities, basketball, soccer
  - Over 10% of youth ED visits for concussion are from horseback riding, ice skating, golfing, AT vehicles, and sledding CDC, 2021

CONCUSSION IN CHILDREN/ADOLESCENTS

- **How long do symptoms last?**
  - Most symptoms resolve in 1-4 weeks post injury
  - 80% of HS athletes recover in 3 weeks (Collins 2006)
  - Cognitive symptoms typically return to baseline in 5-7 days for most, though 29% had post-concussive symptoms at 3 months (Babcock et al., 2013

PREDICTORS/RISK FACTORS OF PROLONGED SYMPTOMS

- Number and severity of concussions and subacute symptoms
  - Subacute headache or depression after injury are good predictors of persistent symptoms >1 month (Kirkwood, 2012)
  - 3+ concussions

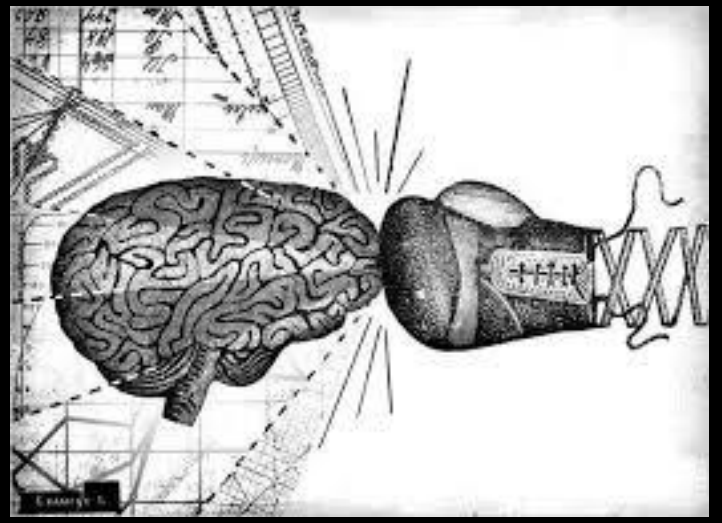
- Premorbid cognitive functioning
  - Depression, learning disabilities, ADHD
  - Brain reserve capacity (BRC, Satz, 1993)

PREDICTORS/RISK FACTORS OF PROLONGED SYMPTOMS

- Psychiatric history explains 38-65% of the variance in post-concussion mental health problems (Gornall et. Al., 2020)
- Mental health screening is important when a child has experienced a concussion
- Assess suicidal ideation and self-harm behaviors during an evaluation and in follow-up visits (Ledoux, et al., 2021)

PREDICTORS/RISK FACTORS OF PROLONGED SYMPTOMS

- SES
  - Resources, social
- Family environment
  - Family burden, psychological distress
  - Family conflict/dysfunction = blame, anger, splitting, projection of needs on child (stay home with me!)
  - Strong family environment = safety, support, reassurance
    - Neurological recovery, animal models (Kolb, 1989)

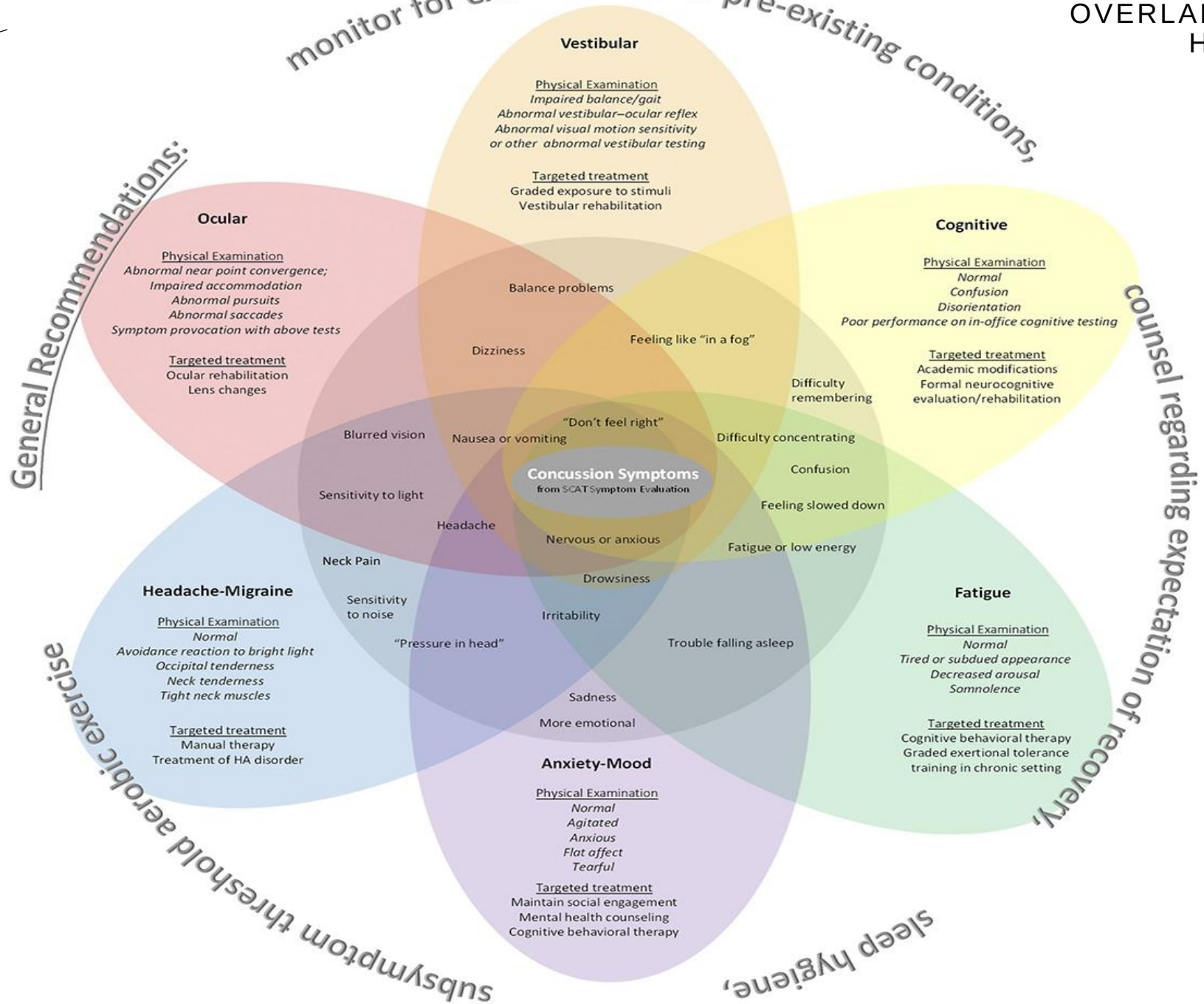


ASSESSMENT

ASSESSMENT FACTORS

- **Not discussed today, but important:**
  - **Baseline assessment/preseason:**
    - Sports Concussion Assessment Tool 5th edition (SCAT 5)
    - ImPACT (baseline or serial assessment)
  - **Sideline evaluation of suspected concussion**
    - SCAT-5 (brief neurological evaluation, symptom checklist)
    - SAC (immediate/delayed memory)

OVERLAPPING CLINICAL PROFILES, HARMON ET. AL 2019



ASSESSMENT FACTORS

- **Injury and Recovery – 5P Assessment**
  - Predisposing factors
  - Premorbid factors
  - Precipitating factors
  - Prolonging factors
  - Protective factors

ASSESSMENT FACTORS

- **Concussion/mTBI History**
  - How many?
  - Nature of the injury
  - Interval between injuries
  - Severity of symptoms
  - “Expanding” symptom profile

CLINICAL INTERVIEW

- Interview
  - Parents
  - Child alone
- Coaches/teacher
  - What is the child like
  - Social skills

CLINICAL INTERVIEW - PSYCHOLOGICAL FACTORS

- **What does each person in the family think about the concussion?**
  - Interviewing the family
  - Interviewing the child alone

- **Consider the identity of the athlete/child**
  - Varsity athlete, college/semi-pro/pro
  - Culture in the team/sport/club
  - Expectations

CLINICAL INTERVIEW - PSYCHOLOGICAL FACTORS

- **Interviewing the child**
  - Response to being INJURED
    - Loss, vulnerability, pain, past experience with LOSS (fam, friends, etc)
  - Response to RECOVERY
    - Frustration, impatience, anxiety, isolation, magnification/catastrophizing
  - Minimizer or Amplifier
  - Other factors
    - Sleep, team/non-team interaction, school/friend loss
    - Perceptions of recovery

NEUROPSYCHOLOGICAL EVALUATION

- Neuro**<u>psychological</u>** assessment is recommended in prolonged symptom recovery (McRory et al., 2017)
- Support clinical decision making and return to play
- Symptom validity and effort
  - Secondary gain
  - Suboptimal effort (failure of SVT around 17-18%, Kirkwood, 2017)
- Provides useful information to the overall treatment plan, school
- Often provides reassurance to families and a path forward

NEUROPSYCHOLOGICAL EVALUATION

- Attention
- Visual/verbal learning and memory
- Inhibitory control/executive functioning
- Motor speed
- Premorbid factors (e.g., reading, etc)
  - Uncovering premorbid issues
- Child and parent questionnaires

ISSUES TO CONSIDER: SUBOPTIMAL EFFORT

- Suboptimal effort
- Secondary gain
- Inadvertent reinforcement

A MULTIDISCIPLINARY TEAM

- Team based approach
- Psychologist, physician, trainer – everyone on the same page

THERAPY FOR PPCS

PROVIDER ROLE IN RECOVERY - OVERVIEW

- Provide general support
- Provide **education** about injury (Psychoeducation)
  - Help anticipate symptoms – “When you start exercising, you may initially feel more fatigue or headache”
- Observe/measure aspects of behavior, cognitive, and emotions
- Address maladaptive coping strategies (avoidance, unhealthy behaviors, social challenges)
- Address challenges to identity, future plans, goals
- Help manage fear of re-injury, how to come back to sport
- Supprt treatment adherence
- Support problem solving/resilience skill development
- Respond to psychological symptoms and reactions

PSYCHOLOGICAL RESPONSE TO INJURY

- Depression or depressed mood is commonly reported after injury,

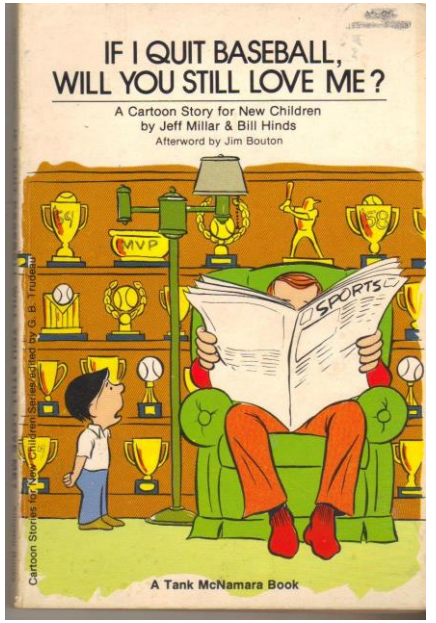
  independent on severity of injury, and during recovery
- Construct of DERAILMENT: connected to depression and involves perceived changes to identity and self-direction (Ratner et al, 2019; Ratner & Burrow, 2021)
- Identify with their former self
- Fueled by the U's: **U**ncertainty, **U**nknowing, **U**nsure, **U**nseen/**U**nheard
- Fear of re-injury or underachievement or unmet expectations

Coppel

PSYCHOLOGICAL FACTORS

- **Consider:**
  - With almost all physical injuries that prevent athletes from training (or block people from working or pursuing valued activities) in their usual way for a “substantial” amount of time, there is a psychological injury to be assessed and possibly addressed (Coppel)
- Brief check-ins or more protracted assessment/therapy

PARENT FACTORS



- Managing worried parents
  - Is this the end of my child's sports career?
  - Is my child going to fail in school?
  - Is my child brain injured?

- Expectations about concussion and head injury
  - "I read about this online and I'm scared that X, Y, Z
- Guilt – did I push my child too far?
- Family culture around sports and athletics
- Family culture around academics

TREATMENT INTERFERENCE

- Family characteristics
- Secondary gain
- “Honorable way out”

TREATMENT TARGETS

- Headache
  - Medical treatments: medications managed by PCP or neurologist, vestibular therapies (esp for pediatric patients, see Alsalaheen 2010)
- Cognitive impairments
  - Stimulant medications
    - Consider side effects
- Sleep
  - Sleep hygiene
  - Melatonin
- Emotional disorders
  - SSRIs

COGNITIVE/BEHAVIORAL THERAPY

Collaborative Care for Adolescents With Persistent Postconcussive Symptoms: A Randomized Trial

Carolyn A. McCarty, PhD,[a,b] Douglas Zatzick, MD,[c,d] Elizabeth Stein, BA,[a] Jin Wang, PhD, MS,[d] Robert Hilt, MD,[c,e] Frederick P. Rivara, MD, MPH,[a,b,d] for the Seattle Sports Concussion Research Collaborative

abstract

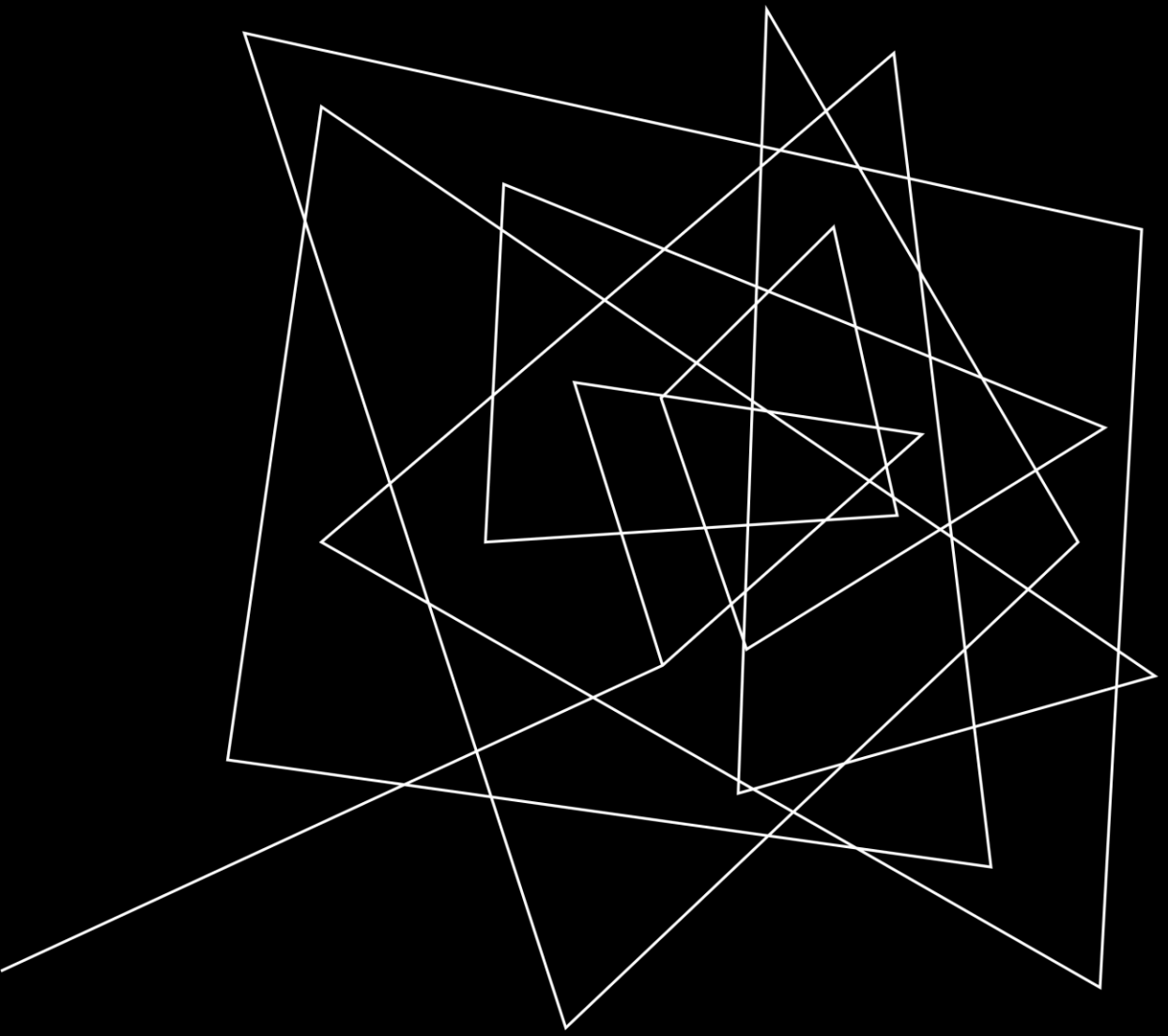
BACKGROUND AND OBJECTIVES: Postconcussive and co-occurring psychological symptoms are not uncommon after sports-related concussion and are associated with functional impairment and societal costs. There is no evidence-based treatment targeting postconcussive symptoms in children and adolescents. The goal of this study was to test a collaborative care intervention model with embedded cognitive–behavioral therapy, care management, and psychopharmacological consultation. We hypothesized that patients in collaborative care would demonstrate greater reductions in postconcussive, depressive, and anxiety symptoms and improvement in functioning over the course of 6 months, compared with usual care control.

METHODS: Patients aged 11 to 17 years with persistent symptoms ≥1 month after sports-related concussion were randomly assigned to receive collaborative care (n = 25) or care as usual (n = 24). Patients were assessed before randomization and after 1, 3, and 6 months. Groups were compared over time via linear mixed effects regression models.

- **Collaborative Care** = CBT + rehab physician, pediatrics, psychiatry
- **Care As Usual** = rehab physician, pediatrics, psychiatry, sports med, pain
- **78% of CC showed >50% reduction in depressive symptoms versus 45.8% in CAU**

COGNITIVE/BEHAVIORAL THERAPY

- Cognitive Behavioral Therapy
  1. Psychoeducation
  2. Self-monitoring
     - Data!
     - What makes the symptoms better/worse?
     - Avoidance/anxiety
  3. Targeting core symptoms
     - Symptoms are mild but avoiding?
     - Goals? Return to play?
     - Adherence to medical recommendations, PT, gradual exposure to activity, sleep?

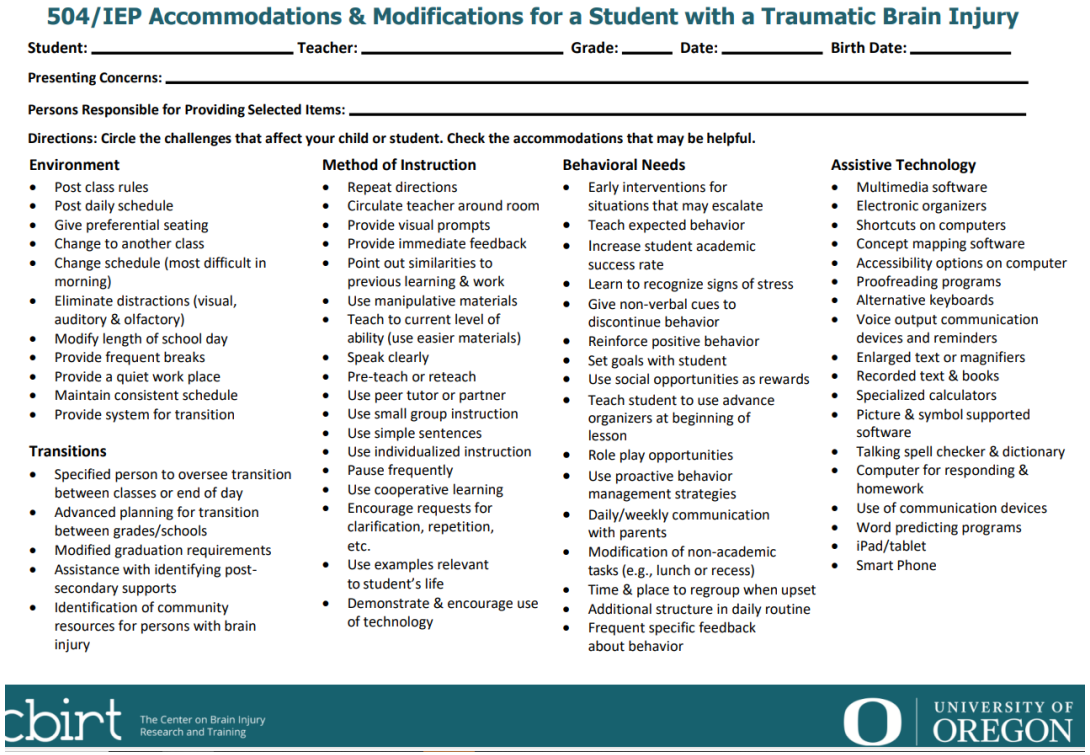


SCHOOL-BASED SUPPORT

RETURN TO SCHOOL

- Once medically cleared/released to return to school
- Section 504 Plan

- The Center
- High Desert ESD
  - Sue Hayes
- Return to School
  - https://returntoschool.org/
- CBIRT
  - https://cbirt.org/



504/IEP Accommodations & Modifications for a Student with a Traumatic Brain Injury

Student: _____ **Teacher:** _____ **Grade:** _____ **Date:** _____ **Birth Date:** _____

Presenting Concerns: _____

Persons Responsible for Providing Selected Items: _____

Directions: Circle the challenges that affect your child or student. Check the accommodations that may be helpful.

Environment

- Post class rules
- Post daily schedule
- Give preferential seating
- Change to another class
- Change schedule (most difficult in morning)
- Eliminate distractions (visual, auditory & olfactory)
- Modify length of school day
- Provide frequent breaks
- Provide a quiet work place
- Maintain consistent schedule
- Provide system for transition

Transitions

- Specified person to oversee transition between classes or end of day
- Advanced planning for transition between grades/schools
- Modified graduation requirements
- Assistance with identifying post-secondary supports
- Identification of community resources for persons with brain injury

Method of Instruction

- Repeat directions
- Circulate teacher around room
- Provide visual prompts
- Provide immediate feedback
- Point out similarities to previous learning & work
- Use manipulative materials
- Teach to current level of ability (use easier materials)
- Speak clearly
- Pre-teach or reteach
- Use peer tutor or partner
- Use small group instruction
- Use simple sentences
- Use individualized instruction
- Pause frequently
- Use cooperative learning
- Encourage requests for clarification, repetition, etc.
- Use examples relevant to student's life
- Demonstrate & encourage use of technology

Behavioral Needs

- Early interventions for situations that may escalate
- Teach expected behavior
- Increase student academic success rate
- Learn to recognize signs of stress
- Give non-verbal cues to discontinue behavior
- Reinforce positive behavior
- Set goals with student
- Use social opportunities as rewards
- Teach student to use advance organizers at beginning of lesson
- Role play opportunities
- Use proactive behavior management strategies
- Daily/weekly communication with parents
- Modification of non-academic tasks (e.g., lunch or recess)
- Time & place to regroup when upset
- Additional structure in daily routine
- Frequent specific feedback about behavior

Assistive Technology

- Multimedia software
- Electronic organizers
- Shortcuts on computers
- Concept mapping software
- Accessibility options on computer
- Proofreading programs
- Alternative keyboards
- Voice output communication devices and reminders
- Enlarged text or magnifiers
- Recorded text & books
- Specialized calculators
- Picture & symbol supported software
- Talking spell checker & dictionary
- Computer for responding & homework
- Use of communication devices
- Word predicting programs
- iPad/tablet
- Smart Phone

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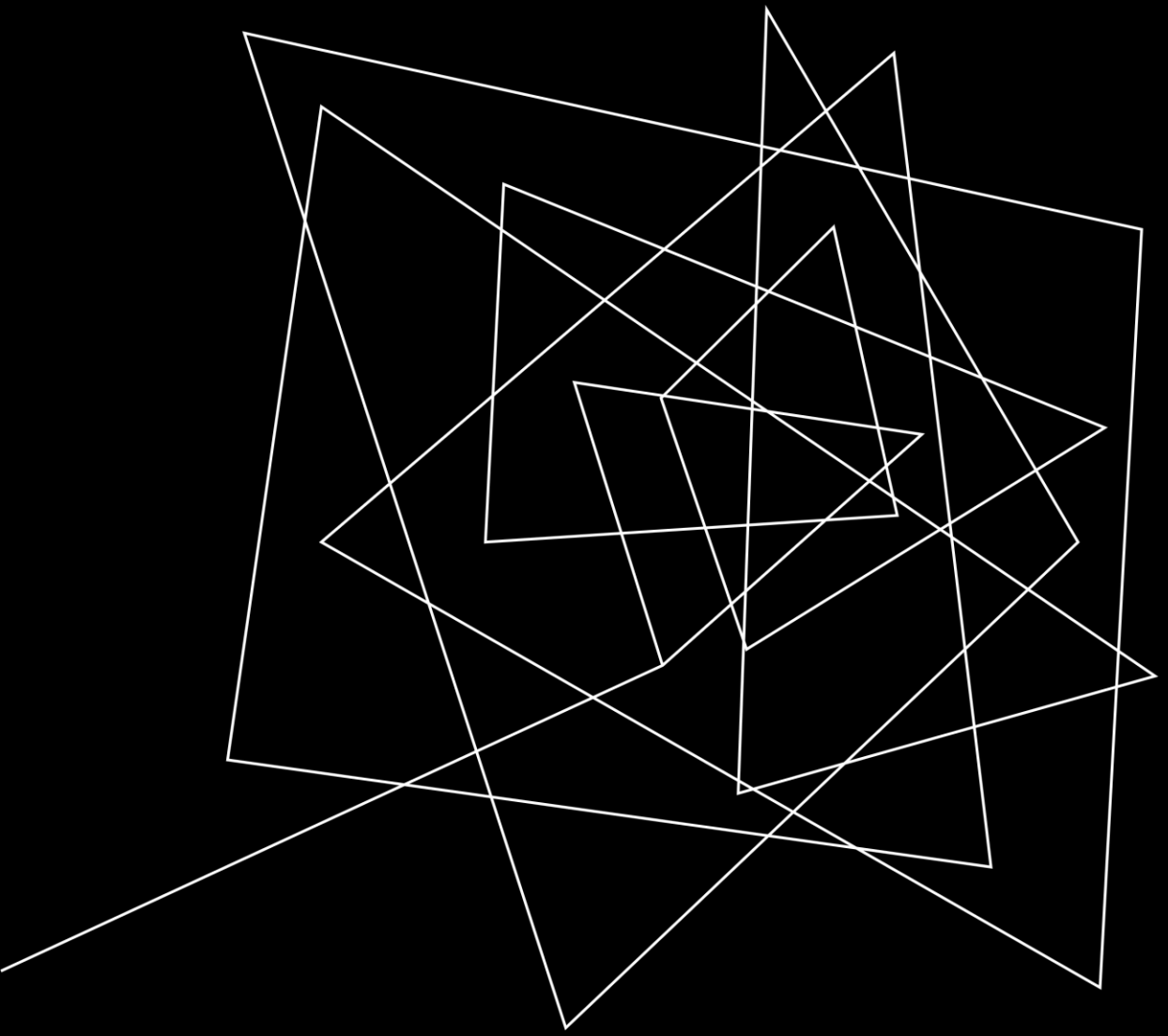
RETURN TO SCHOOL

- Educational/Academic Accommodations
  - Attendance:
    - Excused absences after injury
    - Begin at ¼ to ½ days and progress to full days
  - Classes
    - Sit in front of class
    - Avoid gym, shop, or technical classes (metal shop)
    - Quiet area for lunch
  - Homework
    - Reduced homework load
    - Allow extra time to complete tasks
    - Written instructions for assignments sent home
    - Teacher’s notes or anonymous note taker
    - Allow tutoring
    - Study hall
    - Additional time to make up work
  - Testing
    - Postpone testing, esp. standardized testing
    - Open book or notes allowed
    - Extra time to complete tests



CASE STUDY

CASE STUDY

Disclaimer: Patient demographics de-identified and not from central Oregon region

- 15 y.o Caucasian male attending sophomore year of high school
- Siblings with migraines, both prescribed methylphenidate for ADHD which helped also reduce migraines
- Patient sustained a concussion during HS basketball
  - Initial symptoms included increased headaches, anxiety, low motivation/withdrawal/depressive behaviors, sensitivity to light, though resolved in 2 weeks
  - Currently, 4 months post concussion and still having migraines “almost daily”

CASE STUDY

- Academic:
  - High functioning, straight A student
  - Taking online courses through UCLA since COVID-19
  - Several friends, though declining friends due to strong Christian faith and concerns about social pressures
- Family:
  - Both parents highly educated
  - Academics strongly encouraged

CASE STUDY

- Cognitive Functioning
  - IQ
  - Learning/Memory
  - Motor
  - Language
  - Attention/Concentration
  - ADHD – very few symptoms observed or reported by school
- Psychological
  - Clinical interview
    - Significant depression
    - Anxiety around school performance
    - Withdrawal related to working to keep up with online class
    - Family financial strain and stress to “keep up” image of family

THANK YOU

- Thank you for your time and interest
- Local Resources
  - https://www.hdesd.org/services/traumatic-brain-injury/
  - Max's Law:
    - https://www.oregon.gov/ode/educator-resources/standards/physicaleducation/Documents/ocampguide.pdf
- National Resources
  - Sports Neuropsychology Society
    - https://www.sportsneuropsychologysociety.com/