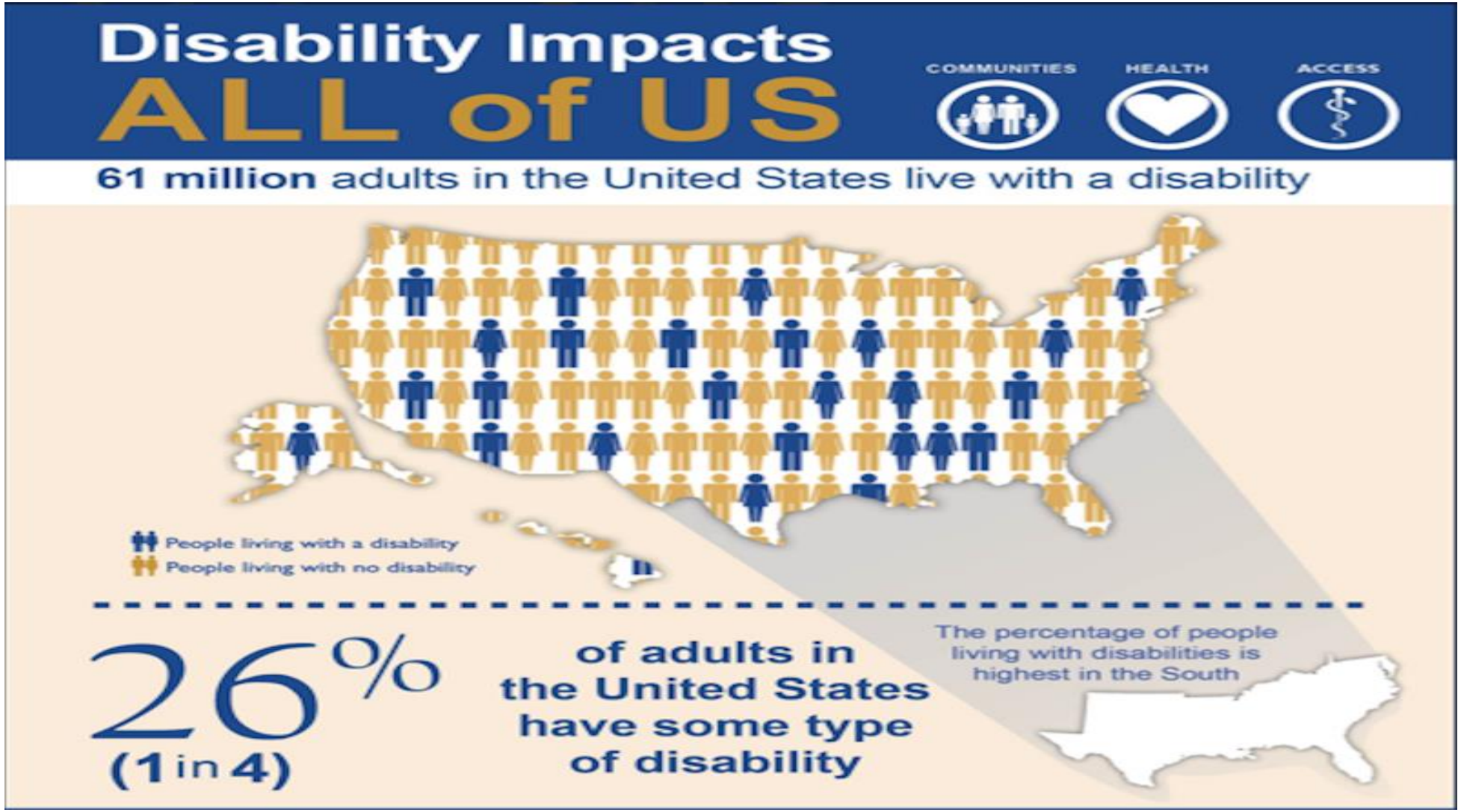
PROGRAMS FOR TRAUMATIC BRAIN INJURY AND COGNITIVE HEALTH

ALEXIS IACCARINO, MD

HOME BASE
VETERAN AND FAMILY CARE

A RED SOX FOUNDATION AND MASSACHUSETTS GENERAL HOSPITAL PROGRAM

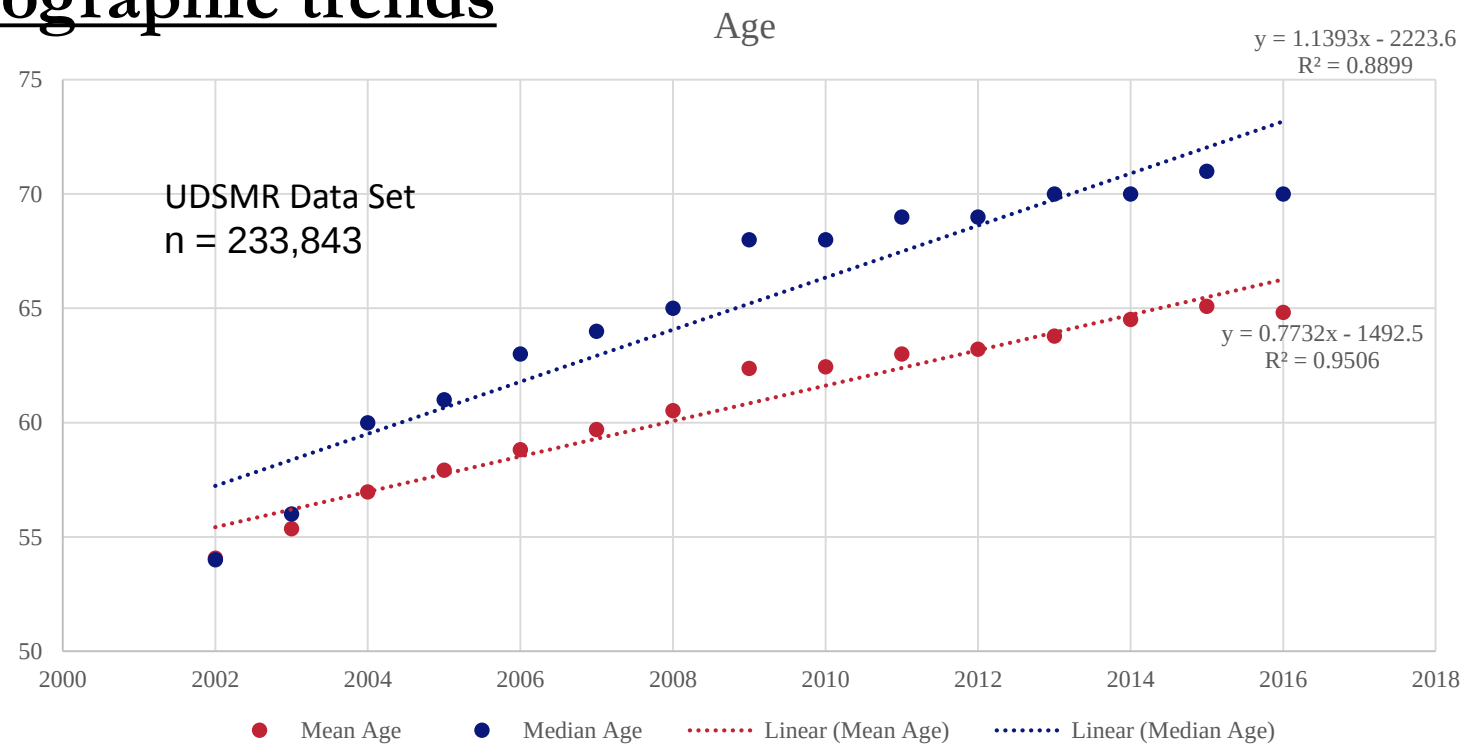
RED SOX FOUNDATION | MASSACHUSETTS GENERAL HOSPITAL


Disability Impacts
ALL of US
COMMUNITIES
HEALTH
ACCESS
61 million adults in the United States live with a disability
People living with a disability
People living with no disability
26%
(1 in 4)
of adults in the United States have some type of disability
The percentage of people living with disabilities is highest in the South

Economic Drivers

MASSACHUSETTS GENERAL HOSPITAL
BRIGHAM AND WOMEN'S HOSPITAL
HARVARD MEDICAL SCHOOL TEACHING HOSPITAL
SPAULDING REHABILITATION NETWORK

Demographic trends



Lamm et al 2019

AGE AT ADMISSION TO REHAB – BRAIN INJURY

Lamm A et al: submitted

TBI IN MILITARY SERVICE MEMBERS

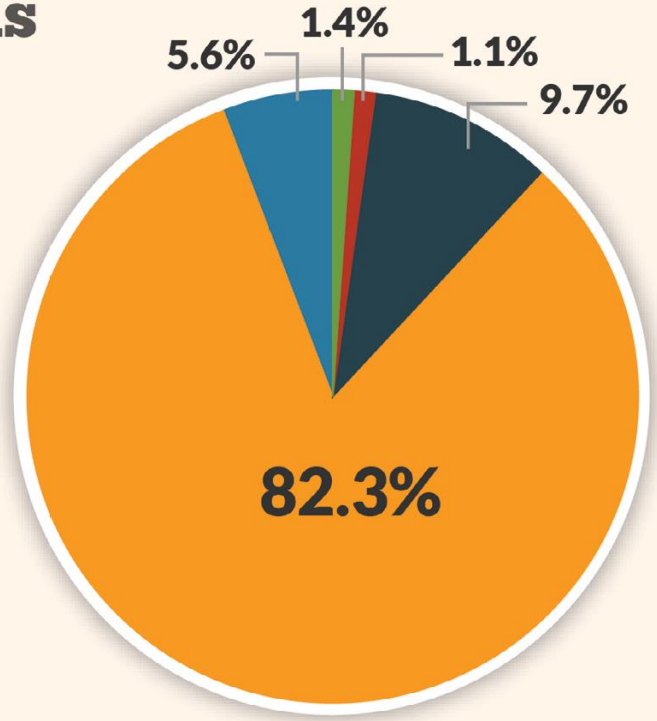
DoD Numbers for Traumatic Brain Injury
Worldwide – Totals

2000 - 2018 Q1

Penetrating	5,215
Severe	4,067
Moderate	37,424
Mild	315,897
Not Classifiable	21,344
Total - All Severities	**383,947**

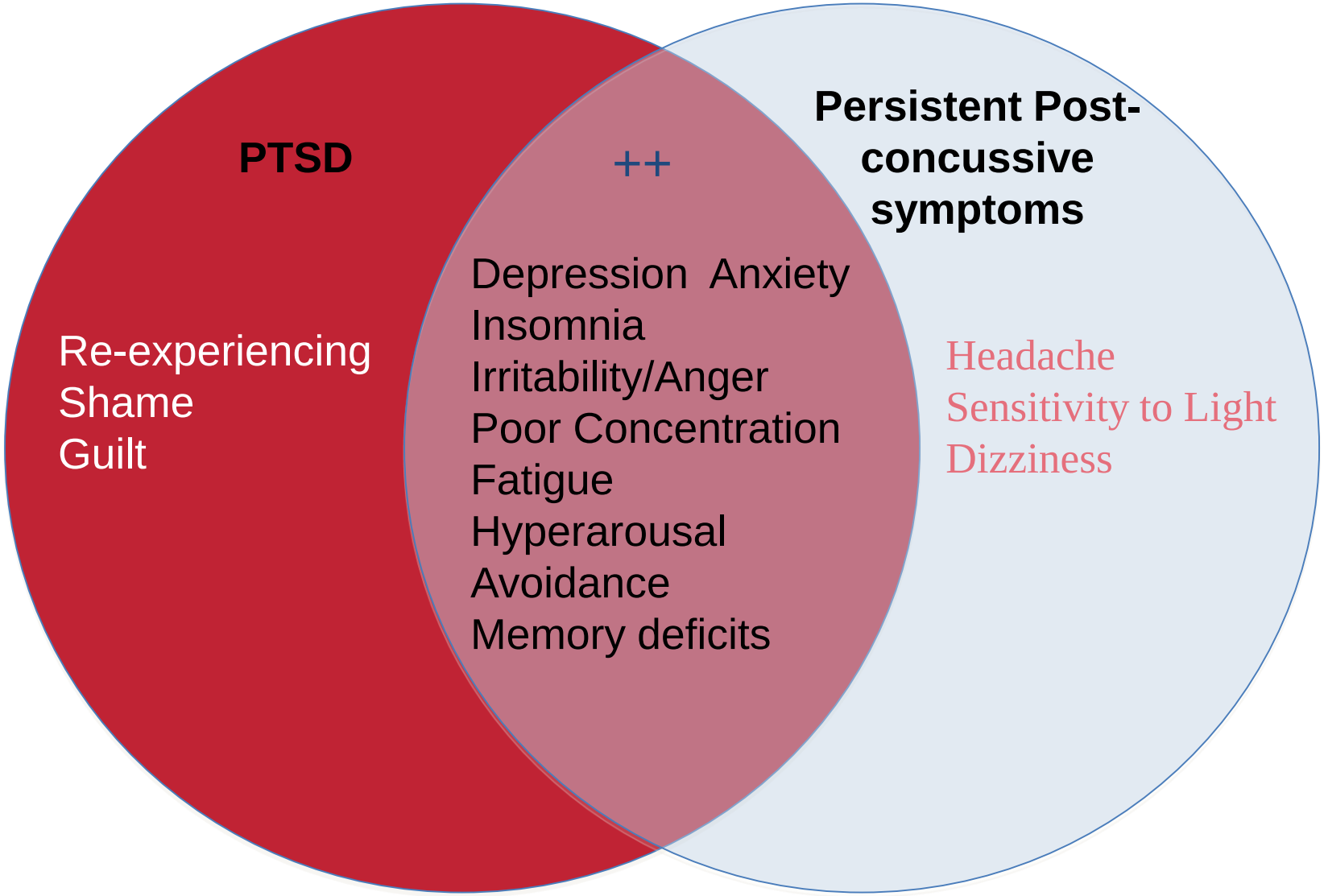
Source: Defense Medical Surveillance System (DMSS), Theater Medical Data Store (TMDS) provided by the Armed Forces Health Surveillance Center (AFHSB)

Prepared by the Defense and Veterans Brain Injury Center (DVBIC)



2000 - 2018 Q1, as of June 21, 2018

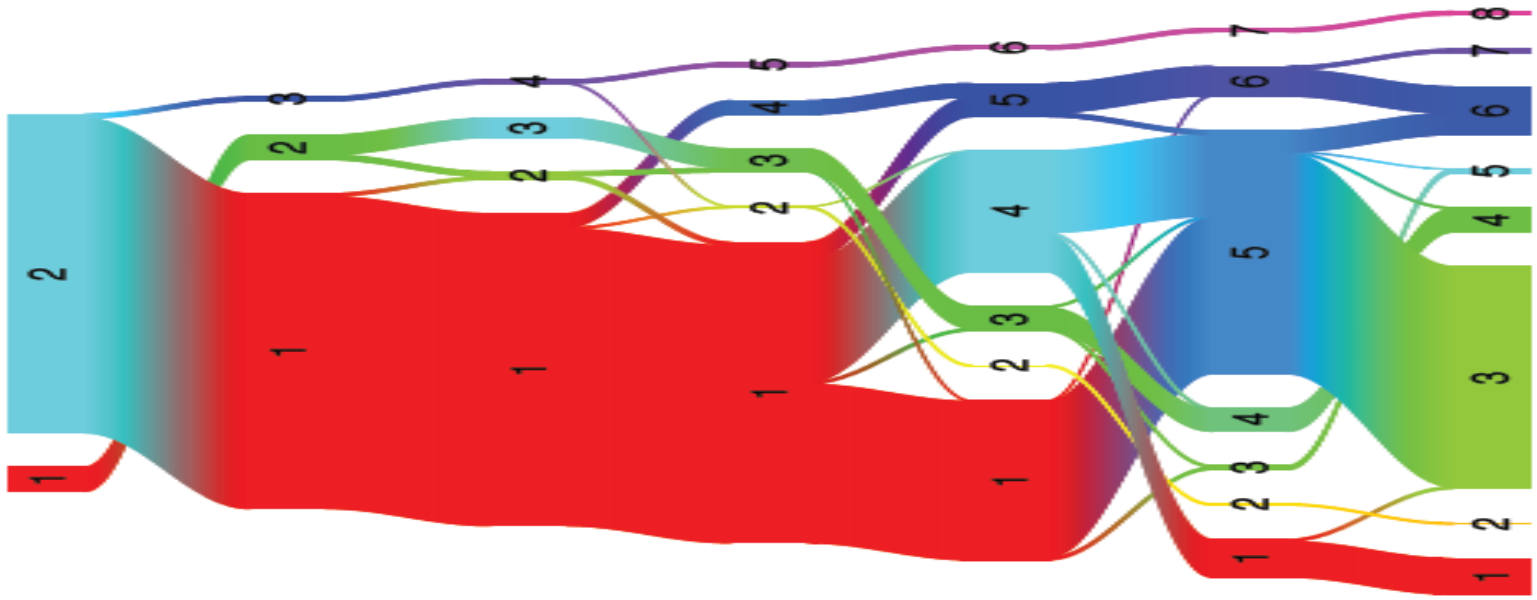
OVERLAPPING ASSOCIATED SYMPTOMS



Adapted from Stein & McAllister (2009)

Does the same thing happen to everyone with so called mild injury?

What causes extreme recovery or decline?



LCC modeling

Gardner R et al
J Neurotrauma 2019

WHY WE WORRY ABOUT THEM?

Physical, cognitive, emotional dysfunction are thought to be linked to repetitive head injury

Association of traumatic brain injury with subsequent neurological and psychiatric disease: a meta-analysis

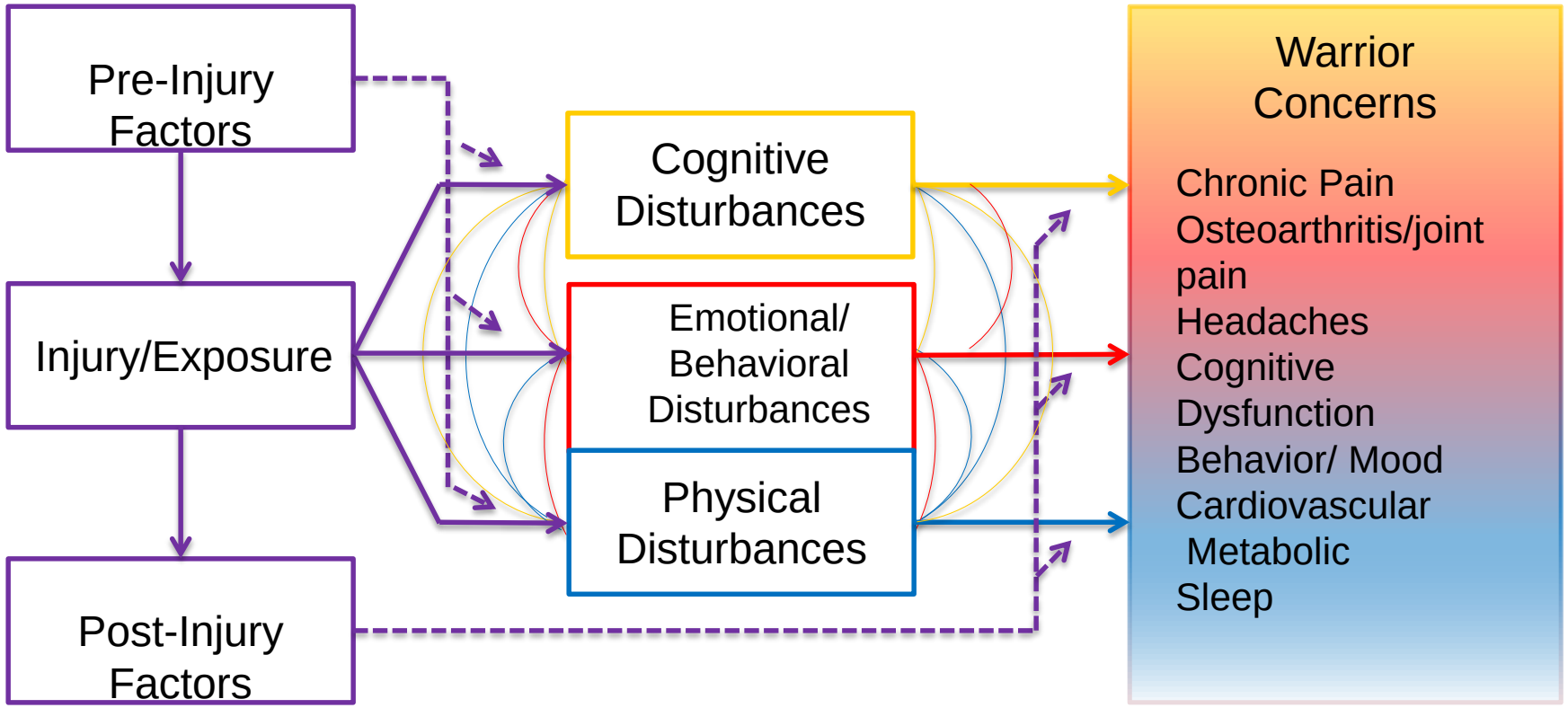
David C. Perry, MD,[1] Virginia E. Sturm, PhD,[1] Matthew J. Peterson, PhD,[4,5] Carl F. Pieper, DPH,[6]
Thomas Bullock, MD,[3] Bradley F. Boeve, MD,[8] Bruce L. Miller, MD,[1]
Kevin M. Guskiewicz, PhD, ATC,[9] Mitchel S. Berger, MD,[2] Joel H. Kramer, PsyD,[1] and
Kathleen A. Welsh-Bohmer, PhD[7]

Neurological (OR 1.55) or psychiatric disease (OR 2.0)

- Alzheimer's disease
- Parkinson's disease
- Mild Cognitive Impairment
- Depression
- Mixed Affective disorder
- Bipolar disorder

UNIQUE LENS

THE INTEGRATED WARRIOR



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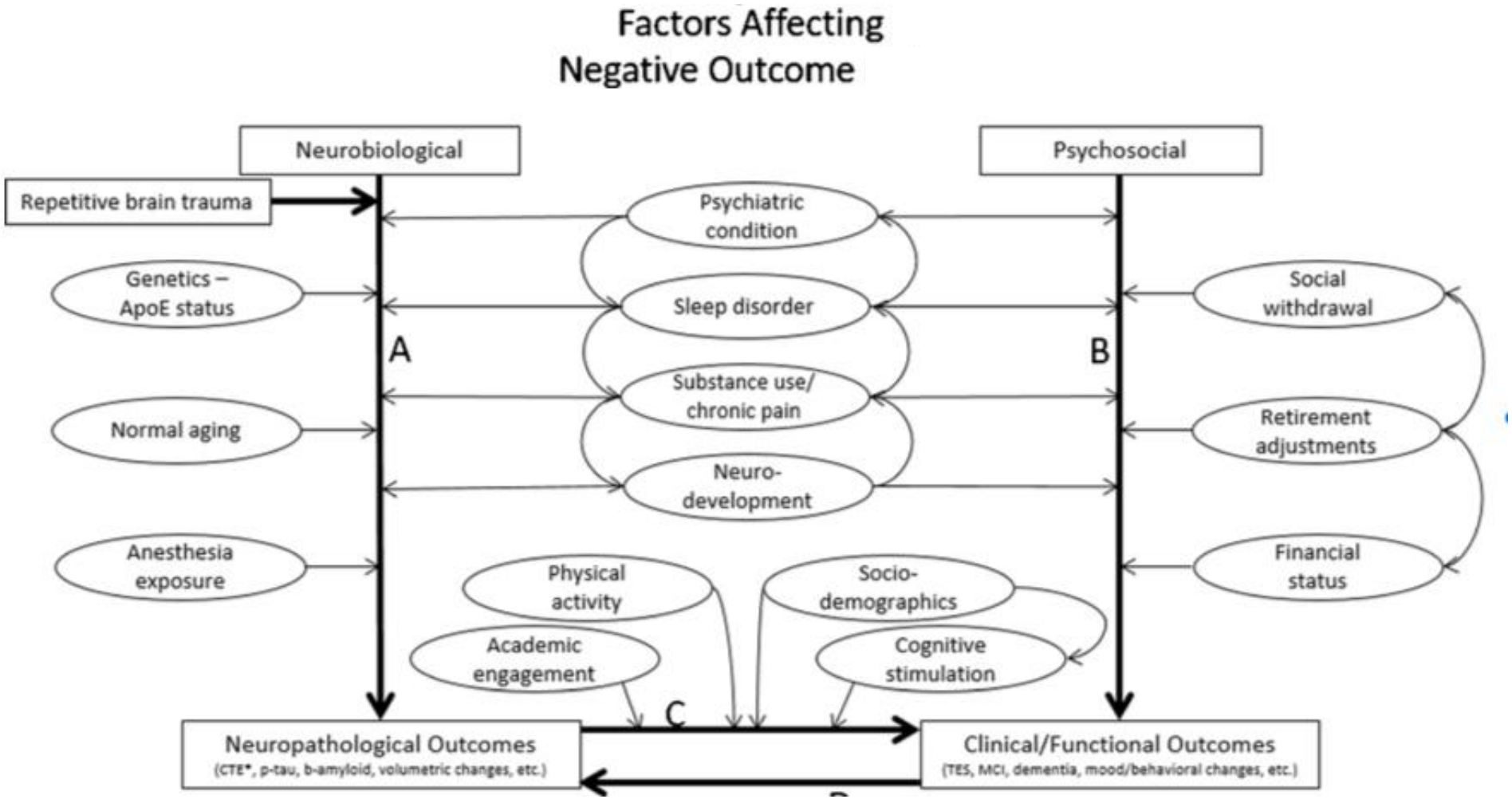
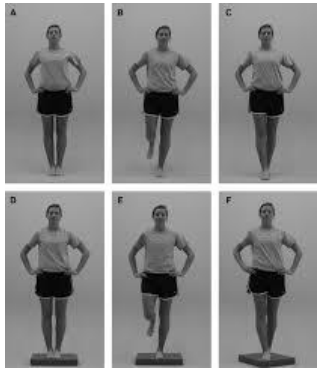
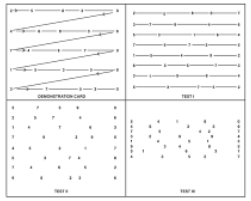
Adapted from Aricniegas and Silver in Zasler, Katz and Zafonte



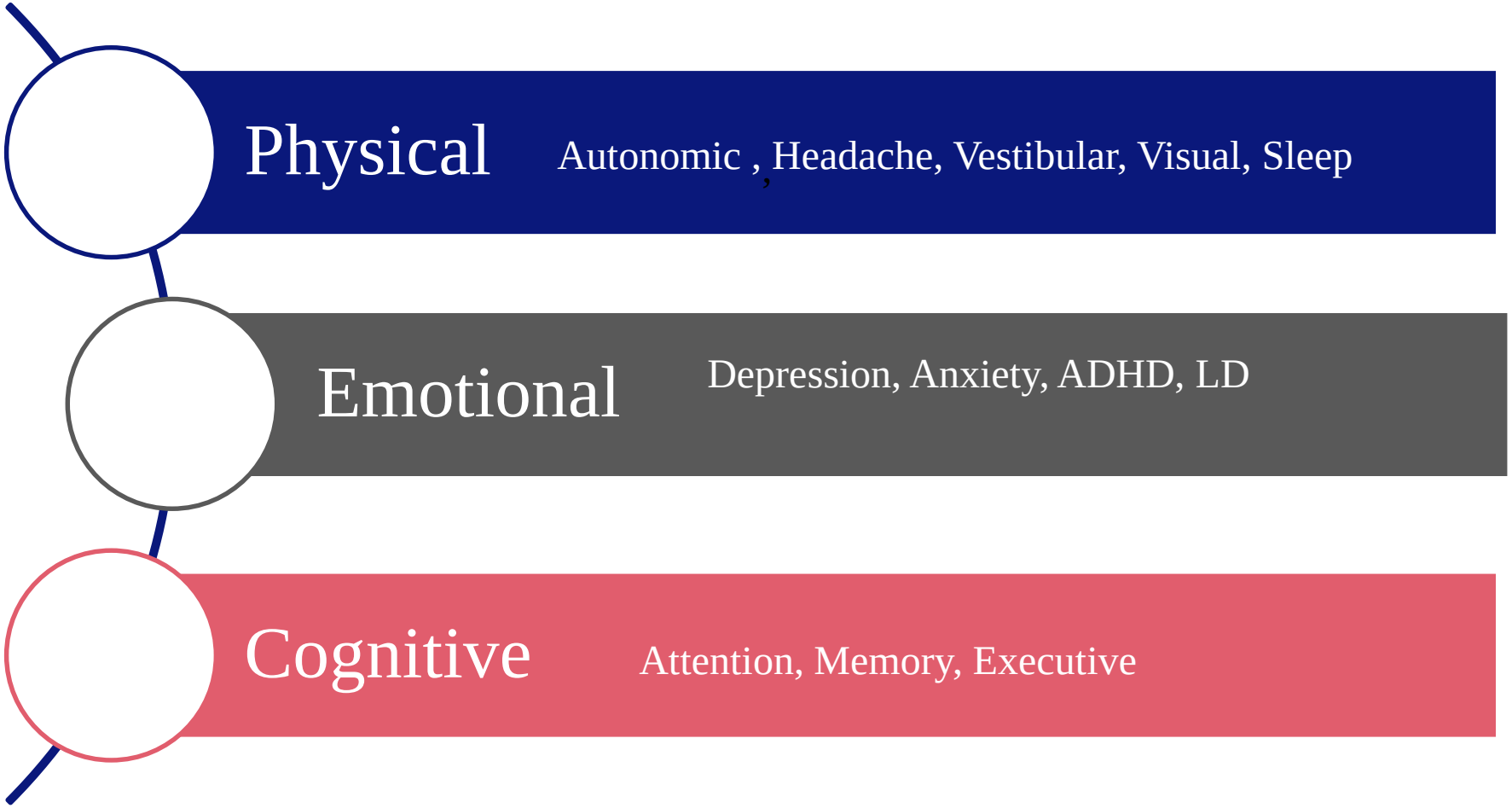
Asken et al 2016

NO SINGLE TEST TO DIAGNOSE A CONCUSSION





OVERVIEW: SYMPTOM COMPLEXES



THE BRAIN AND BODY PROGRAM

A MASSACHUSETTS GENERAL HOSPITAL PROGRAM DEDICATED TO PROVIDING EVIDENCE-BASED MEDICAL CARE TO FORMER NFL PLAYERS TO HELP THEM DEVELOP AND MAINTAIN A HEALTHY BRAIN AND BODY

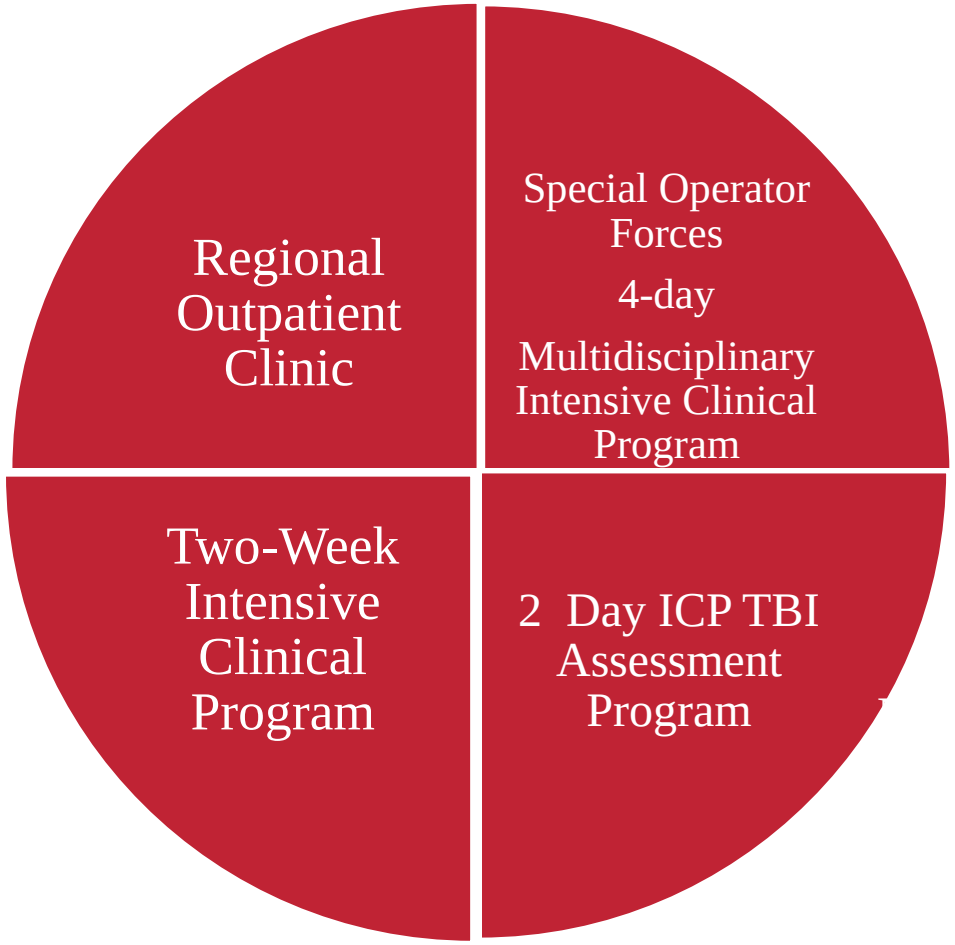
MASSACHUSETTS GENERAL HOSPITAL

THE TRUST
POWERED BY THE NFLPA

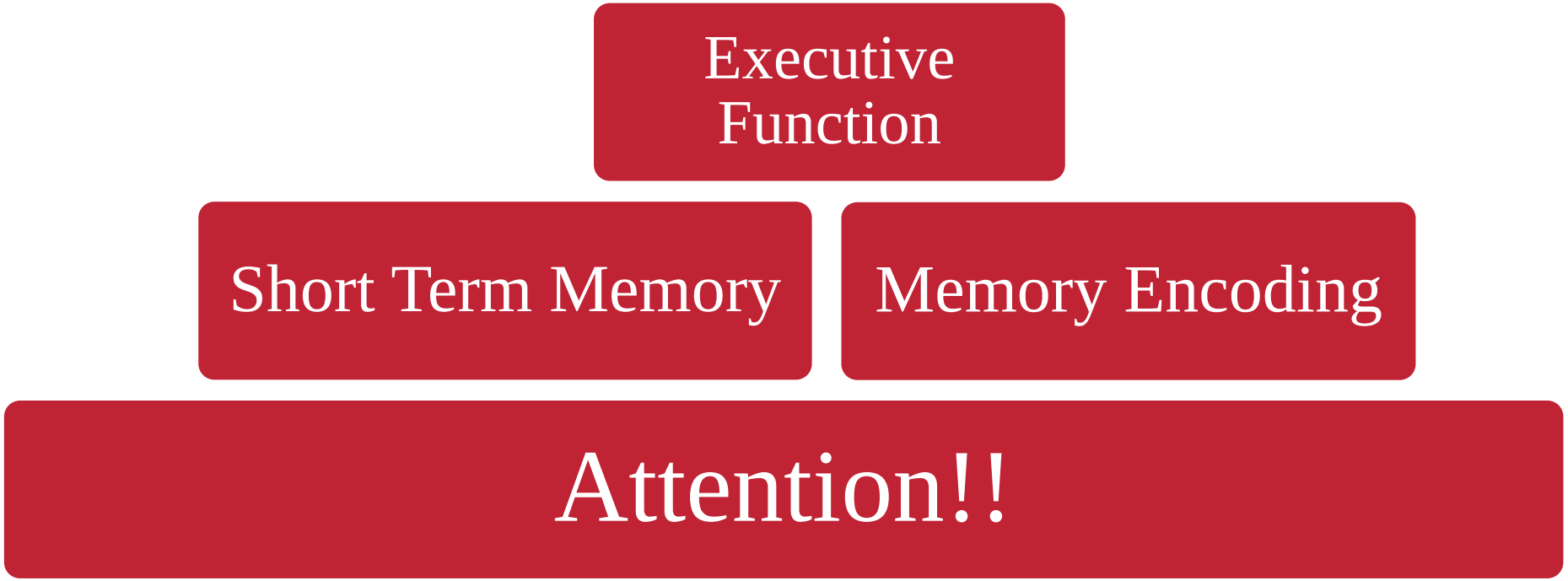
TBI PROGRAMS: RATIONALE

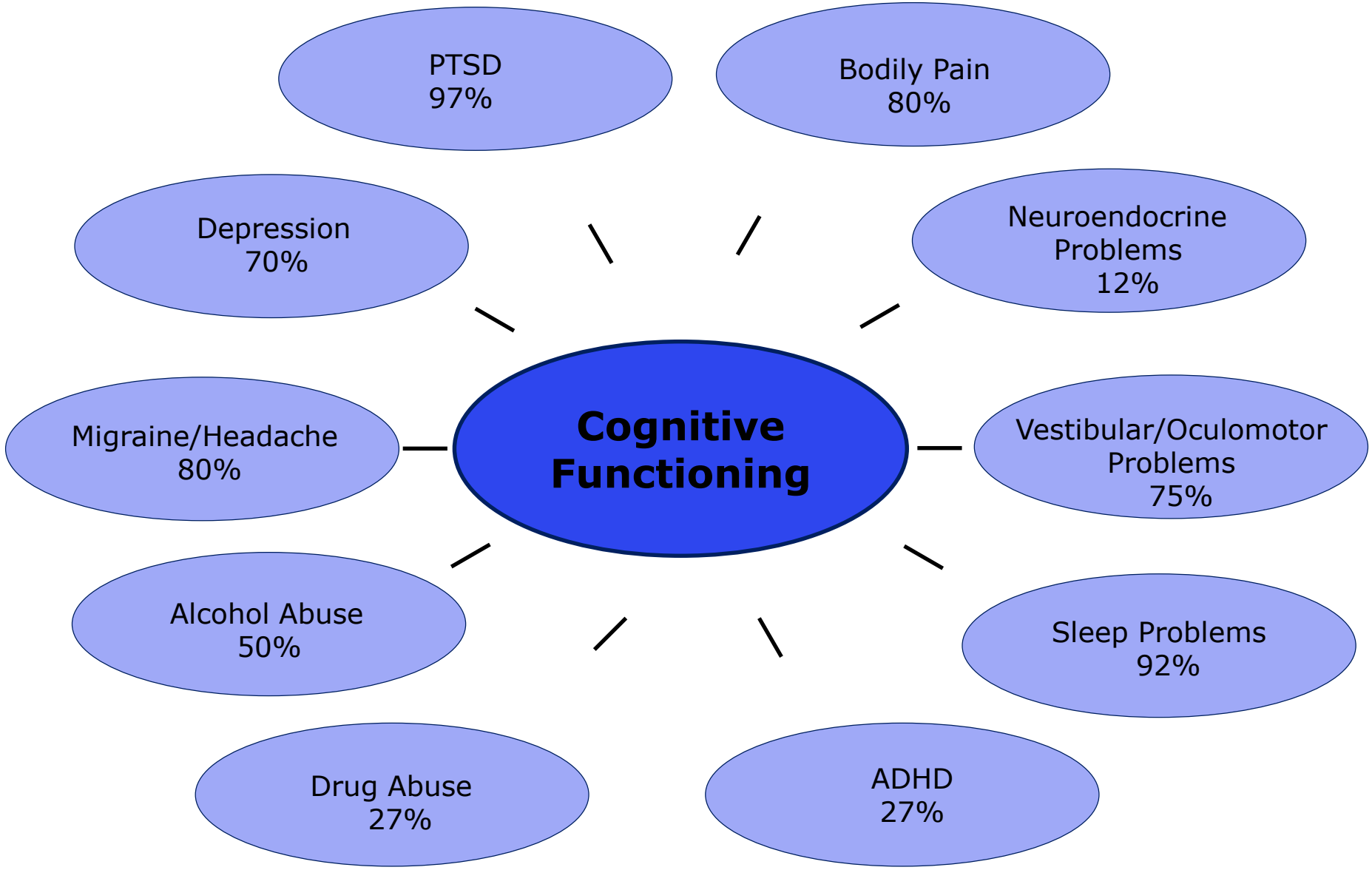
- Military service members that sustain repetitive head trauma often have multiple other comorbidities
- Comorbidities may share similar features to TBI and contribute to long term cognitive, psychological, and physical complaints
- Comorbidities may contribute to neuropathology
- Treatment of comorbidities can improve function, quality of life, and may augment neuropathology

OVERVIEW OF TBI PROGRAMS AT HOME BASE



CONCEPTUALIZING COGNITION




PTSD
97%
Bodily Pain
80%
Depression
70%
Neuroendocrine
Problems
12%
Migraine/Headache
80%
Cognitive
Functioning
Vestibular/Oculomotor
Problems
75%
Alcohol Abuse
50%
Sleep Problems
92%
Drug Abuse
27%
ADHD
27%

HOME BASE TBI/COGNITIVE HEALTH SERVICES

- Intensive Clinical Program (ICP)
  - TBI/Cognitive Health Track
    - Comprehensive 2-day evaluations focused on head injury history
      - PM&R Evaluation
      - Neuropsychology Evaluation
      - Psychiatry Evaluation
      - Psychology Evaluation
      - Physical Therapy Evaluation
  - All ICP participants
    - Cognitive screen
    - Warrior Cognitive Health Group

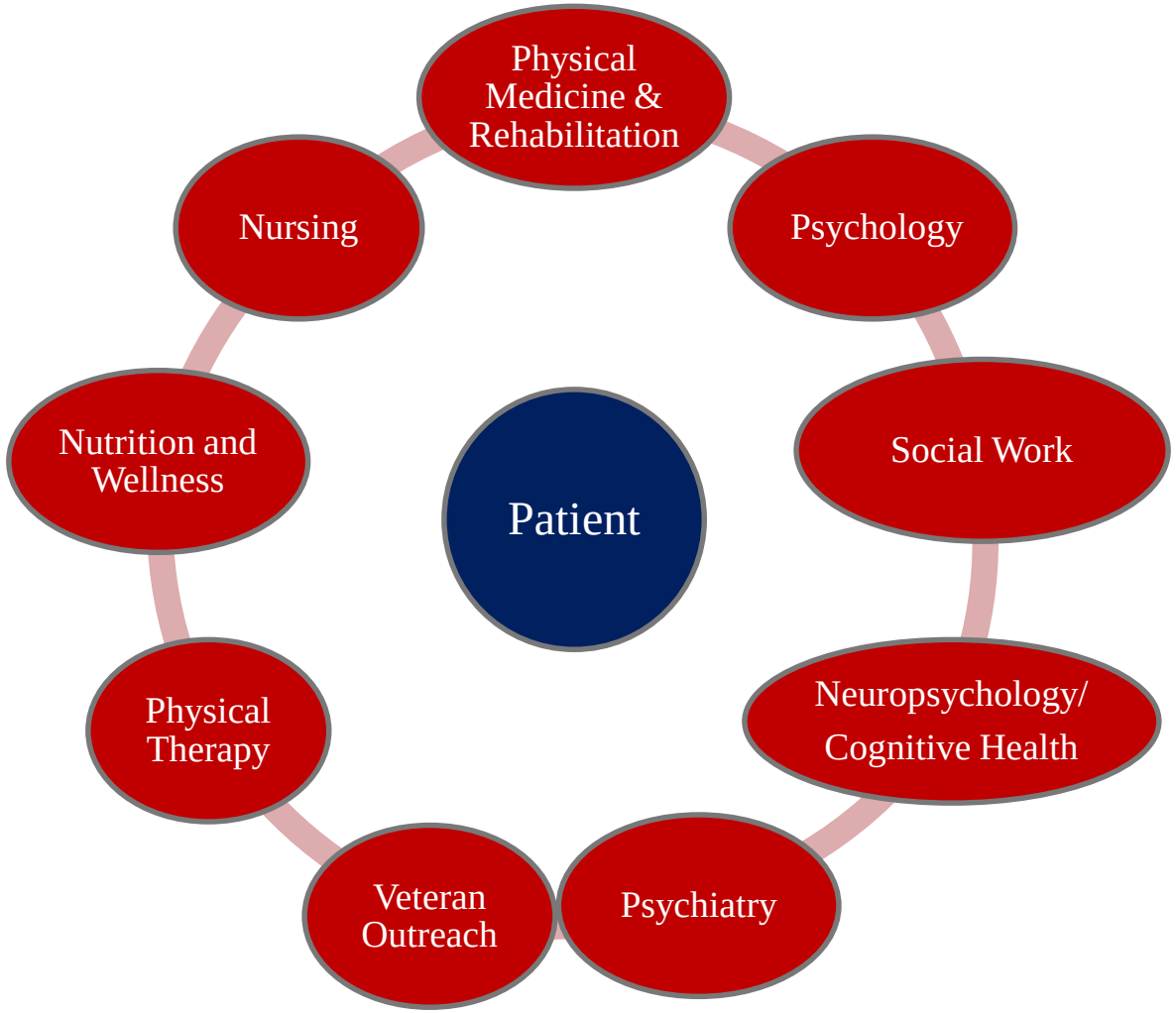
OUR EXPERIENCE: CURRENT ICP 2-DAY MODEL

- In preparation for the 2-week TBI ICP program Home Base provides a comprehensive 2-day evaluation for veterans.
- To date we have conducted over 100 of these assessments

Service	Visit length
Physical Medicine and Rehabilitation Comprehensive Medical Assessment	90 minutes
Neuropsychological assessment	240 minutes
Physical Therapy evaluation	60 minutes
Psychological evaluation	90 minutes
Psychiatric evaluation	60 minutes

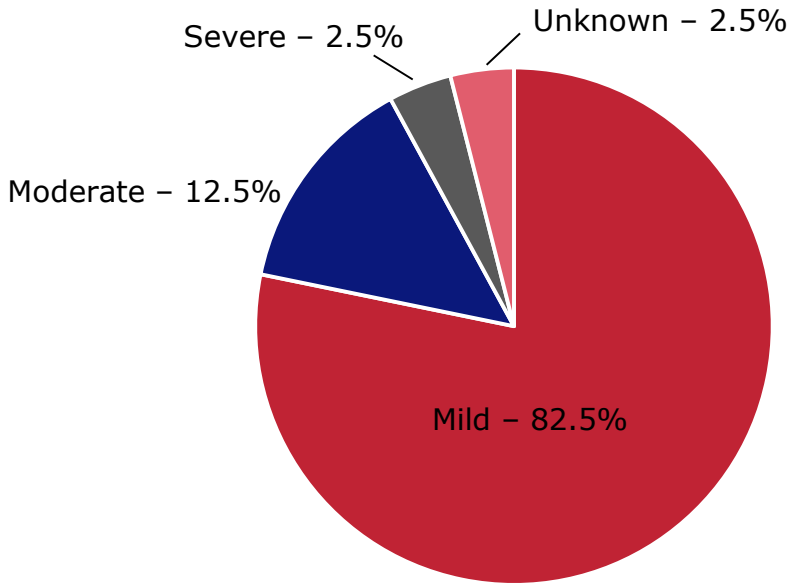
*During the ICP, further specialty medical diagnostic and assessment services are provided based on patient needs

THE INTENSIVE CLINICAL PROGRAM TEAM FOR TBI



TBI/COGNITIVE HEALTH TRACK

- The first 40 participants to complete
  - 95% graduation rate
  - Represented 18 states and 4 branches of service
  - 95% male
  - Average age: 37.6 years
  - Average number of TBI exposures reported: 4.0



NSI DATA

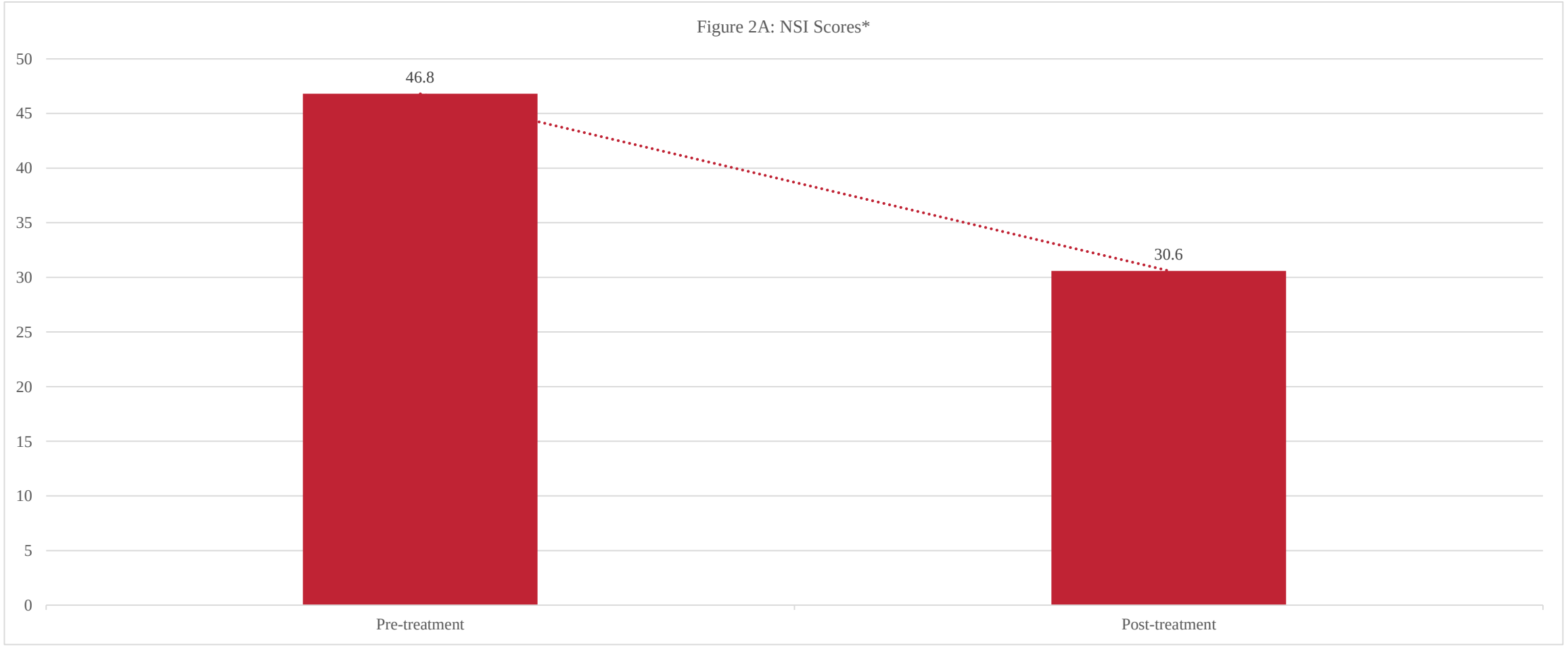


Figure 2A: NSI Scores*
50
45
40
35
30
25
20
15
10
5
0
46.8
30.6
Pre-treatment
Post-treatment

PHQ-9

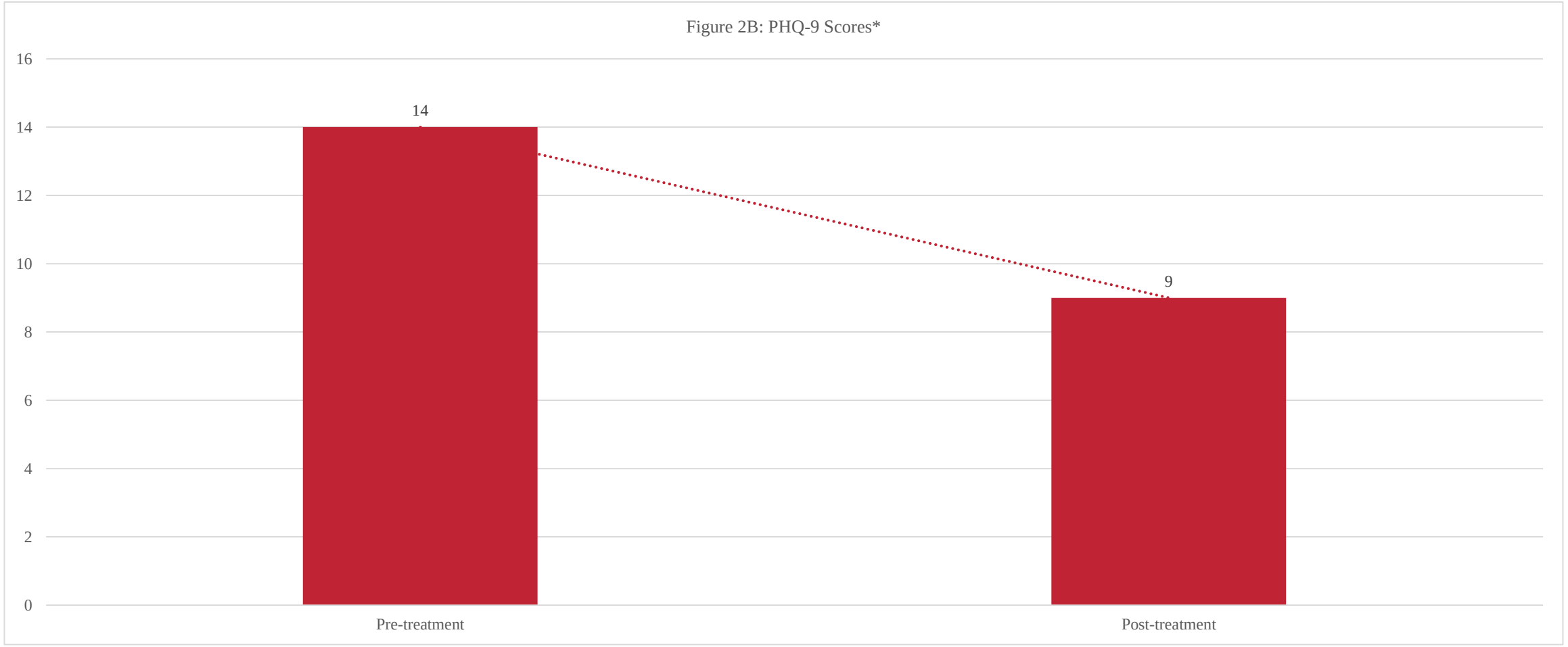
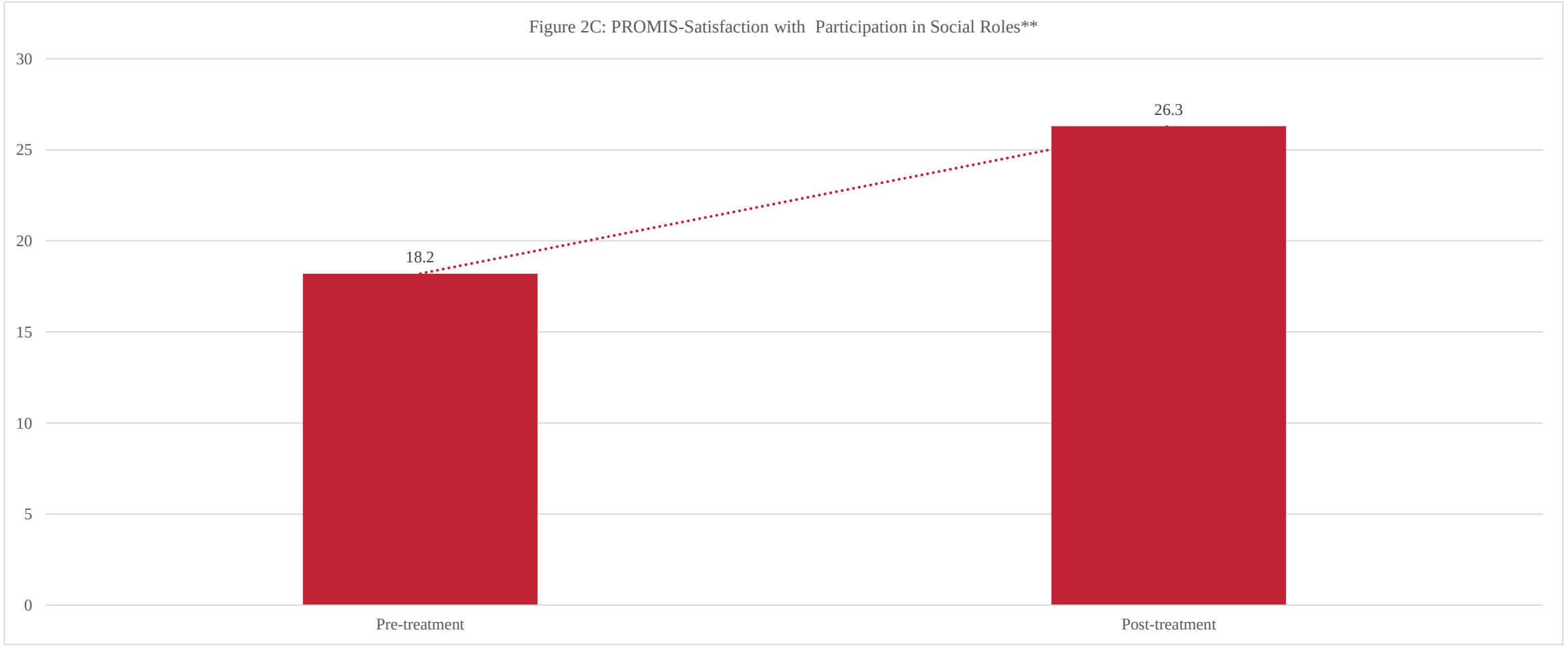


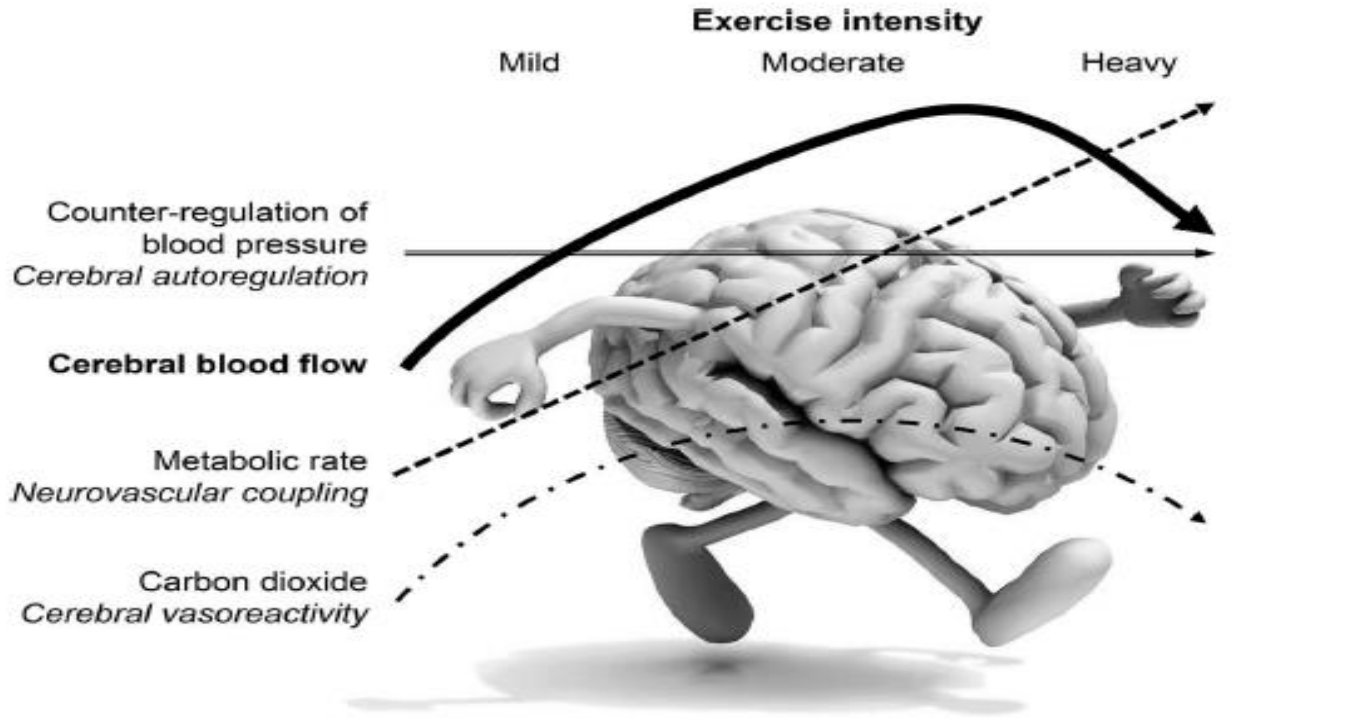
Figure 2B: PHQ-9 Scores*
16
14
12
10
8
6
4
2
0
14
9
Pre-treatment
Post-treatment

REAL WORLD MATTERS



SPECIFICS

VASCULAR DYSREGULATION



Blood pressure increases proportionally to exercise intensity, engaging autoregulation that serves to maintain constant flow. However, at mild and moderate intensities, both metabolic rate and carbon dioxide increase, hence both neurovascular coupling and cerebrovascular reactivity result in increased cerebral blood flow. With heavy exercise intensities, there is a pronounced hypocapnia, and so the net result of the 3 controlling mechanisms is a decrease in cerebral blood flow.

Tan et al

EVOLUTION OF EXERCISE SAFETY

International Consensus Statement - recommendations

- Vienna 2001: **no activity, complete rest**
- Prague 2004: rest until all sx resolve
- Zurich 2008: phys and cog rest until sx resolve
- Zurich 2012: initial period of rest acutely following injury (48hrs) may be beneficial
- Berlin 2016: **brief period of rest during acute phase (24-48 hours) after injury**

DOES REST HELP

- **Benefits of Strict Rest After Acute Concussion: A Randomized Controlled TrialDanny George Thomas, Jennifer N. Apps, Raymond G. Hoffmann, Michael McCrea, Thomas Hammeke Pediatrics 2015**

- Ninety-nine patients were enrolled; 88 completed all study procedures (45 intervention, 43 control).
- As expected, the intervention group reported less school and after-school attendance for days 2 to 5 postconcussion (3.8 vs 6.7 hours total, $P < .05$).
- There was no clinically significant difference in neurocognitive or balance outcomes.
- **However, the intervention group reported more daily postconcussive**

Aerobic Activity!

JAMA Pediatrics | Original Investigation

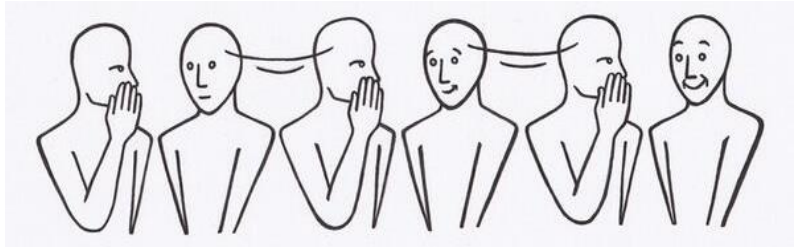
Early Subthreshold Aerobic Exercise for Sport-Related Concussion

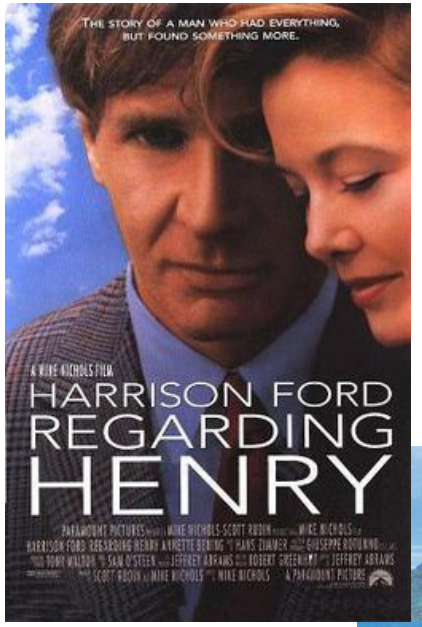
A Randomized Clinical Trial

John J. Leddy, MD; Mohammad N. Haider, MD; Michael J. Ellis, MD; Rebekah Mannix, MD; Scott R. Darling, MD; Michael S. Freitas, MD; Heidi N. Suffoletto, MD; Jeff Leiter, PhD; Dean M. Cordingley, MSc; Barry Willer, PhD

Sources of information on concussion

Many individuals obtain information about concussion from internet searches, television shows, films, football games, boxing matches (Block 2014)





After TBI, >90% believe an individual can be normal in every way aside from recognizing family (Hux 2006).

>25% a second bump on the head can help one remember memories lost from a first bump on the head (Hux 2006).

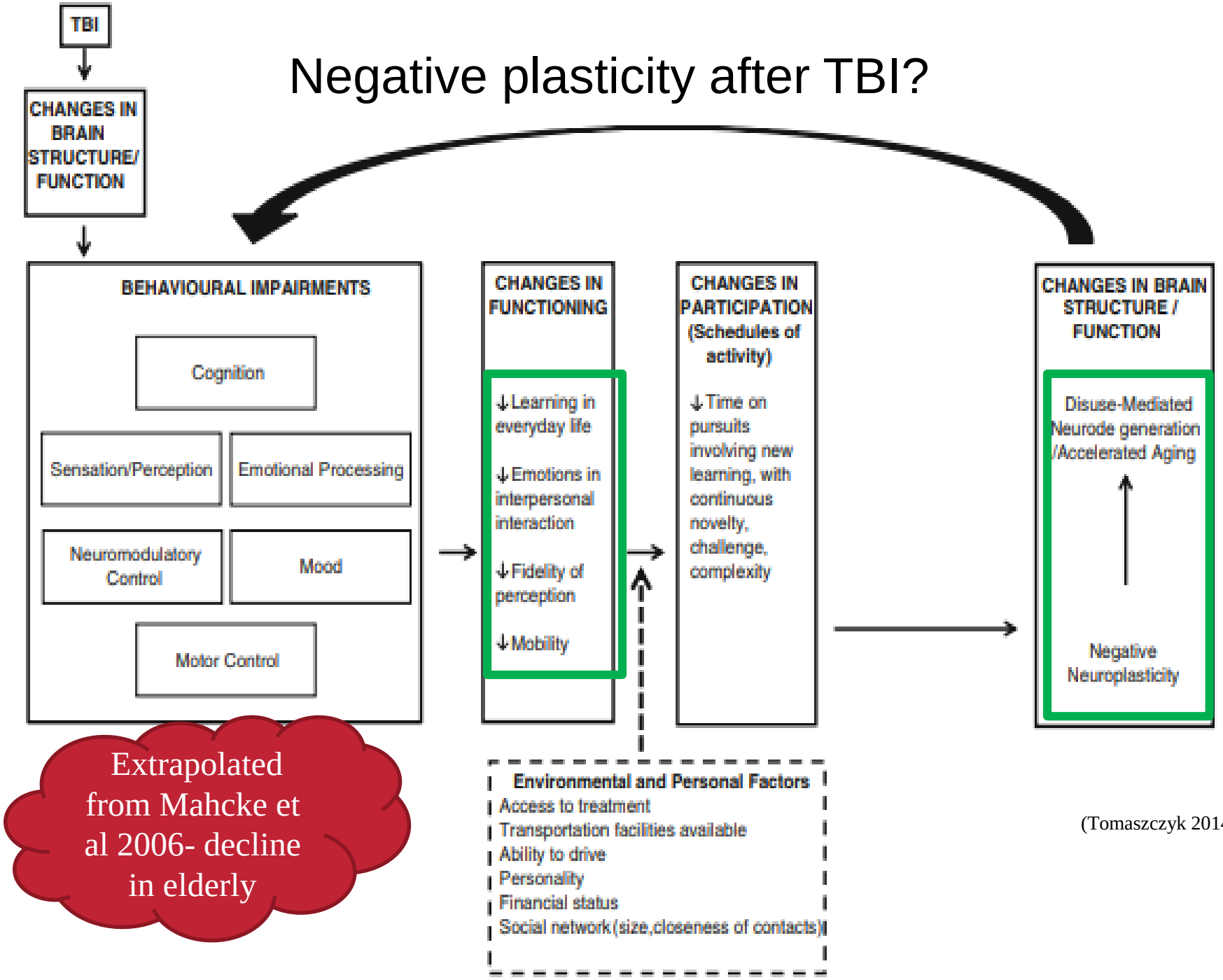
Can correspond with popular Hollywood plotlines (Baxendale 2004). – The MEDIA!

GAPS: HOW TO INFORM REGARDING RISK- ESPECIALLY LONG TERM HEALTH

- How to inform
- Who to inform
- What to inform- when, what and what to do

Could we induce negative thinking!

Negative plasticity after TBI?



Extrapolated from Mahcke et al 2006- decline in elderly

(Tomaszczyk 2014)

WE MOVED!

ONE CONSTITUTION WHARF
CHARLESTOWN, MA 02129

OUR HOME