> In traumatic brain injury, **the greatest problem** is often not the injury; **it is the failure to recognize it, treat it, and properly care for the patient.**

It's what happens **after** the injury.

WHEN THINGS BREAK:
THE SCIENCE OF
TRAUMATIC BRAIN INJURY

For Many:

TBI IS NOT AN EVENT

IT IS THE BEGINNING OF A

CHRONIC DISEASE PROCESS

PREVENTING SECONDARY INJURY

Timely recognition, appropriate treatment, and comprehensive care can change trajectories and improve outcomes.

RISK IS NOT DESTINY, IT IS AN OPPORTUNITY FOR EARLY, TARGETED INTERVENTION THAT CAN IMPROVE OUTCOMES AND RESTORE FUNCTION.

RECOGNIZE EARLY | INTERVENE PROMPTLY | MANAGE COMPREHENSIVELY | IMPROVE OUTCOMES

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WHEN THINGS BREAK: THE SCIENCE OF TRAUMATIC BRAIN INJURY

1 IN 60 PEOPLE

ARE LIVING WITH A PERMANENT BRAIN INJURY–RELATED DISABILITY IN THE UNITED STATES

The early management of traumatic brain injury can change the course of recovery.
This book provides a clear, evidence-based framework for clinicians and patients to achieve better outcomes—sooner.

EARLY RECOGNITION
Identify signs and symptoms early.

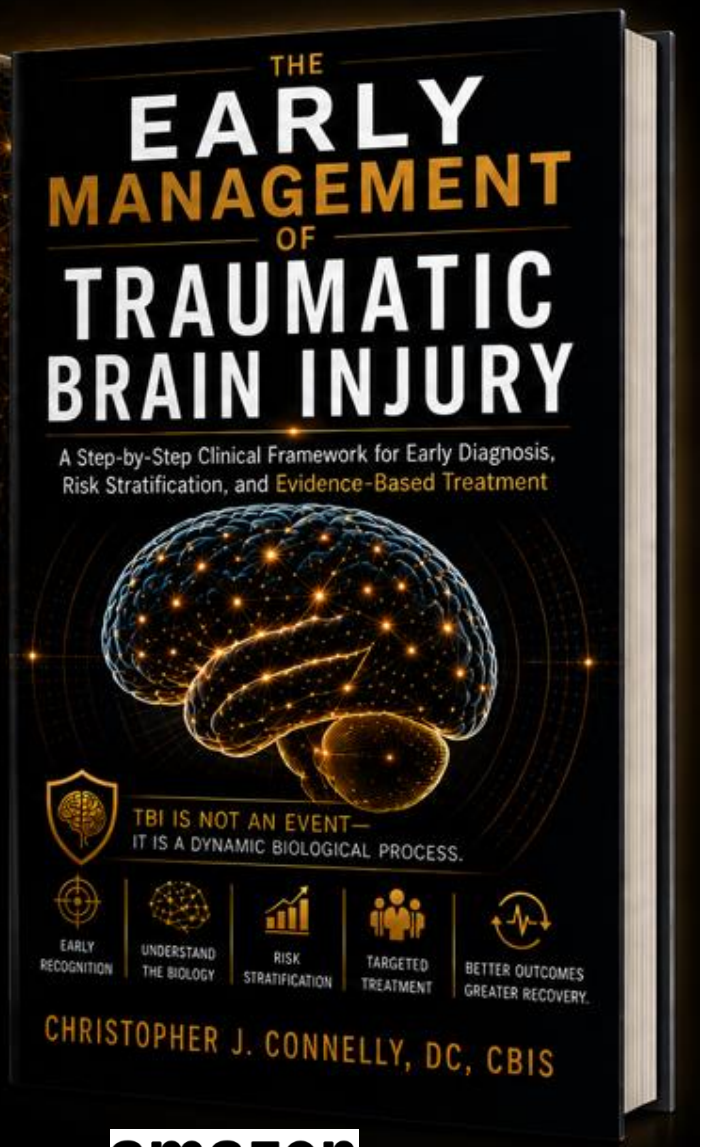
UNDERSTAND THE BIOLOGY
The latest science made practical.

RISK STRATIFICATION
Identify who is at risk for poor outcomes.

TARGETED TREATMENT
Personalized care that makes a difference.

BETTER OUTCOMES GREATER RECOVERY
Improve function. Improve lives.

CHRISTOPHER J. CONNELLY, DC, CBIS
CLINICIAN. RESEARCHER. ADVOCATE.
CHANGING THE FUTURE OF TBI CARE.



amazon

BrainCussion
BRAIN INJURY AWARENESS

Neuro360
Where Every Connection Matters

TBI CHECKLIST FOR PROVIDERS

A concussion is a mild, traumatic brain injury (TBI). We know it is not "mild" when you are the person that just received the injury. It is usually caused by a bump, blow, or jolt to the head that results in the normal function of the brain being altered for a period of time. This checklist will assist with the continuum of care to "screen" (an extended period of unconsciousness or memory loss after the injury). This checklist will help you better recognize the signs/symptoms of a TBI. The information should be shared immediately with the client's treating health care providers should you suspect a TBI has occurred so they can be put through the BrainCussion system for further evaluation.

Wreck Review:

- ☐ Extensive property damage
- ☐ Airbag deployment
- ☐ T-bone
- ☐ High speed impact
- ☐ Multiple impacts
- ☐ Head hit anything?
- ☐ Steering wheel
- ☐ Headrest
- ☐ Side window
- ☐ Windshield
- ☐ Flying debris/object inside vehicle

Symptom Review:

- ☐ Loss of consciousness
- ☐ Any headaches
- ☐ Confusion
- ☐ Disoriented
- ☐ Irritability
- ☐ Dizziness
- ☐ Blurred vision
- ☐ Past history of TBI
- ☐ Sensitivity to light
- ☐ Nausea
- ☐ Vomiting
- ☐ Slurred Speech
- ☐ Fatigue
- ☐ Fogginess
- ☐ Ringing in the ears

Delayed Symptoms:

- ☐ Memory problems
- ☐ Difficulty concentrating
- ☐ Sleep impairment
- ☐ Problems with senses (taste, smell, vision)
- ☐ Balance issues
- ☐ Changes in mood
- ☐ Crying/emotional swings

EARLY IDENTIFICATION. PROMPT ACTION. BETTER OUTCOMES.
Use this checklist at every visit when a head injury is suspected.
Timely recognition and referral can make a lasting difference.

RECOGNIZE. DOCUMENT. | REFER. COLLABORATE. | SUPPORT. EMPOWER. | IMPROVE OUTCOMES.

TRUSTED RESOURCES FOR • BRAIN INJURY EDUCATION & SUPPORT •

BRAINSTRAIN.COM
SCIENCE. EXPERIENCE. COMPASSION. BETTER ANSWERS. BETTER OUTCOMES.
Evidence-based education, resources, and support to help patients and families navigate brain injury recovery.
brainstrain.com

facetinjury.com
Comprehensive information on facet injuries, treatments, and recovery.
facetinjury.com

INJURYUNIVERSITY.com
Advanced training and certification for professionals in personal injury care.
injuryuniversity.com

THE ACADEMY
CLINICAL EXCELLENCE DRIVES SUCCESS
Evidence-based courses and resources for healthcare professionals.
theacademylnc.com

impairmentdoctor.com
Helping providers understand impairment ratings and causation determination.
impairmentdoctor.com

www.BrainCussion.com | 888-7-CONCUSSION | Referrals: intake.neuro360care.com

Dr. Connelly's cell: 678-200-7587

Core Paradigm Shift in TBI:

TBI Is Not an Event It Is the Beginning of a Chronic Disease Process

Old Paradigm
Traumatic brain injury was viewed as a simple, structural event, with outcomes determined primarily at the moment of impact.

New Paradigm
Traumatic brain injury is a dynamic, multi-phase biological process involving primary injury, secondary pathophysiological cascades, and individualized recovery trajectories that require early, targeted, and ongoing management.

TBI is chronic, evolving condition in which early recognition and targeted management can alter the clinical trajectory and improve functional recovery. Thie initial injury is not the end of the event, it is the beginning of a process, and that process can be influenced.

For many years, brain injuries were thought to be a one-time event something that happens and then either heals or doesn't. We now know that is not accurate. A traumatic brain injury starts a chain reaction inside the brain, including inflammation, reduced blood flow, and problems with how the brain produces and uses energy. These changes can affect how different parts of the brain communicate, even when CT scans or MRIs look normal. This is why some people recover quickly while others continue to have headaches, memory problems, dizziness, or mood changes. The injury is not just what happened at the moment of impact, it is an ongoing biological process that can continue to affect the brain over time.
Following the primary mechanical injury, secondary cascades occur, including: (not a complete list)
Excitotoxicity
Mitochondrial dysfunction
Neuroinflammation
Oxidative stress
Blood–brain barrier disruption
Altered cerebral blood flow
Hormonal / endocrine
Metabolic Vulnerability

The brain's high metabolic demand (~20% oxygen, ~25% glucose despite ~2% body weight) makes it particularly susceptible to post-injury metabolic disruption and energy crisis.

Large-scale studies, including TRACK-TBI and multiple meta-analyses, demonstrate that approximately 30–50% of patients with mild TBI experience persistent symptoms beyond the expected recovery period. This variability highlights the importance of clinical trajectories, emphasizing longitudinal assessment over single time-point evaluation. Early recognition, risk stratification, and targeted intervention are critical. Failure to address ongoing secondary injury processes may contribute to prolonged recovery and chronic impairment, whereas structured, multidisciplinary care can significantly improve outcomes.

OLD TBI PARADIGMS
The brain was viewed as relatively simple and fixed.
TBI was considered primarily a structural problem.

Focus was placed on survival and visible damage.
If imaging was normal → the patient was assumed to be “fine.”
Symptoms were minimized or dismissed.
All patients were treated similarly, with limited personalization.
Recovery was expected to be linear, uniform, and time dependent.
Care was often passive, “rest and wait.”
Prognosis was determined at the moment of injury.

NEW TBI PARADIGMS

The brain is a complex, dynamic, and adaptive system.
In some, TBI is the start of a chronic disease process.
Injury includes primary damage and secondary injury cascades that unfold over time. Dysfunction often reflects network and functional disruption, not just structural damage.
Risk factors do not define the outcome they define the opportunity for early intervention.
Recovery is nonlinear and individualized.
Outcomes are strongly influenced by early recognition, appropriate management, and prevention of secondary injury.

This book is not intended to be read passively. It is designed to be used actively in clinical practice during patient evaluation, treatment planning, and real-time decision-making in the early stages of TBI care. This model is consistent with emerging calls to move beyond traditional severity classifications toward more nuanced, multidimensional approaches. TBI is not defined solely by the initial event, but by the cascade of biological changes that follow and the quality of care delivered over time.

The TBI Care Framework is designed to answer seven fundamental clinical questions:

Question	**Framework Component**
What is a TBI?	Core Paradigm
How do we think about TBI?	3 Pillars of Clinical Thinking
When do we act to help?	7 Phases of Care
What do we do?	10 Core Clinical Steps
How do we execute / outcomes?	6 Clinical Drivers
What do we treat TBI?	10 Scientific Targets
How to guide individual recovery?	Clinical Trajectories
Simple recommendations?	NEURO TBI Care

CORE PARADIGM SHIFTS

TBI as a Chronic but Modifiable Disease Process

1. TBI is not a static event but the beginning of a dynamic and evolving biological process.
2. Secondary injury mechanisms, including inflammation, metabolic dysfunction, and altered cerebral physiology, develop over time following the initial injury.
3. These processes may not be detectable on standard imaging but are well-supported in the scientific literature as contributors to ongoing dysfunction.
4. Because secondary injury evolves over time, it represents a potentially modifiable phase of injury.

5. Early identification of risk factors allows for targeted intervention, which may reduce progression and improve outcomes. Therefore, risk for chronic symptoms is not deterministic, but rather reflects an opportunity for early clinical intervention.

THE 3 PILLARS OF CLINICAL THINKING

The framework is anchored in three core principles:

1. Early Recognition

TBI is primarily a clinical diagnosis. Early identification based on mechanism, symptoms, and examination is critical, particularly given the limitations of imaging.

2. Understanding Biology and Networks

TBI is a disorder of brain function:

- energy metabolism
- neural connectivity
- system regulation

This network-based perspective aligns with contemporary neuroimaging and connectome research.

3. Care by Clinical Trajectory

Recovery is not linear. Patients exhibit heterogeneous trajectories, requiring individualized, adaptive care strategies.[7]

THE 7-PHASE OF CARE

This phase-based approach ensures continuity, consistency, and completeness of care. The actionable framework through a structured seven-phase process:

- Safety First – rule out life-threatening injury
- Identify the Problem – diagnosis, PPCS risk and subtypes
- Protect the Brain – prevent secondary injury
- Targeted Individual Treatment – address specific dysfunctions
- Team-Based Care – integrate multidisciplinary management
- Return to Life – restore functional capacity
- Reassess and Optimize – adjust care based on trajectory

THE 10 CORE MANAGEMENT STEPS

10-step clinical framework for early TBI management:

1. Rule out life-threatening injury
2. Apply standardized TBI diagnostic criteria (ACRM)
3. Identify concussion subtypes
4. Screen for risk of persistent symptoms
5. Screen for psychological trauma
6. Screen for apathy and neurobehavioral changes
7. Preventing secondary brain injury
8. Manage symptoms with targeted interventions
9. Educate patients and caregivers
10. Co-manage care with appropriate specialists

This sequence is intentional. Clinicians should move through these steps systematically rather than addressing symptoms in isolation. An accurate diagnosis is the first step to a successful outcome. Without it, treatment is delayed, misdirected, or missed entirely. These steps function as a clinical checklist to reduce variability and improve outcomes.

THE 6 CLINICAL DRIVERS

The framework's effectiveness depends on six execution drivers:

- objective measurement
- subtype classification
- risk stratification
- secondary injury prevention
- multidisciplinary care
- return-to-life progression

These drivers ensure that care is consistent, scalable, and outcome oriented.

The 10 Scientific Targets

TBI affects multiple biological systems simultaneously. The framework identifies ten key targets: (there are many more)

1. energy metabolism
2. sleep and glymphatic function
3. inflammation
4. autonomic regulation
5. vestibular function
6. ocular-motor function
7. cervical function
8. cognition
9. mood
10. functional capacity

There are many other clinically important targets, but this should be evaluated on an individual basis. Targeting these domains moves care beyond symptom management to physiologic recovery.

NEURO TBI CARE FRAMEWORK

The NEURO TBI Care Framework is a biologically driven, systems-based approach that actively targets the underlying mechanisms of the secondary injury cascade, emphasizing that concussion recovery requires guided intervention rather than passive rest.

Through five core pillars:

Nutrition
Exercise
Unwind
Restorative Sleep
Optimize

Designed restores energy, regulates brain function, reduces inflammation, restores homeostasis and promotes both recovery and long-term brain resilience. TBI recovery is built through consistent daily habits that stabilize physiology, support neuroplasticity, and gradually improve function over time.

"**Grandma's Rules"** will also be presented and represents a structured, behaviorally anchored application of Cognitive Behavioral Therapy combined with lifestyle medicine principles.

CLINICAL TRAJECTORIES

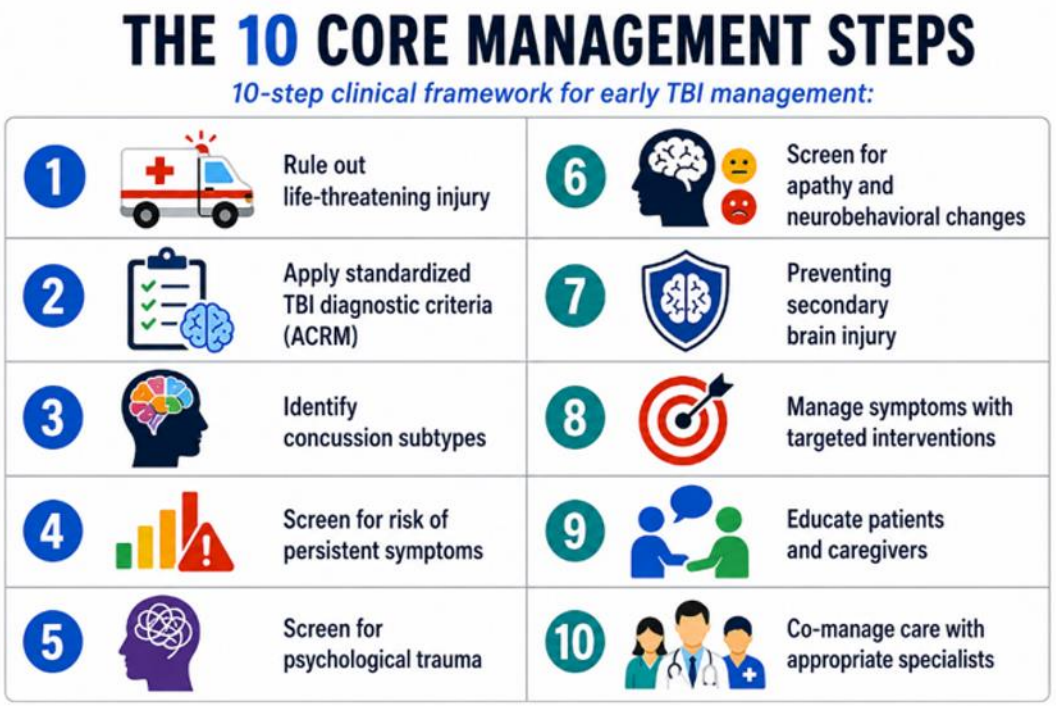
Recovery following TBI is unique to each patient. **Patients typically follow one of three trajectories:**

- **improving**
- **plateauing**
- **worsening**

Trajectory-based care ensures that treatment is continuously adapted based on patient response rather than predetermined timelines.

The TBI Care Framework is designed as a structured system addressing the key clinical questions:

- Why is the patient symptomatic?
- How should clinicians think about the injury?
- When should interventions occur?
- What actions are required?
- What biological systems must be treated?
- How should recovery be guided over time?



THE TBI CARE FRAMEWORK

The TBI Care Framework is designed to answer seven fundamental clinical questions.

QUESTION	FRAMEWORK COMPONENT
What is a TBI?	Core Paradigm
How do we think about TBI?	3 Pillars of Clinical Thinking
When do we act to help?	7 Phases of Care
What do we do?	10 Core Clinical Steps
How do we execute / outcomes?	6 Clinical Drivers
What do we treat TBI?	10 Scientific Targets
How to guide individual recovery?	Clinical Trajectories

"TIME WINDOWS" LAYER

Integrating Clinical Timing with the Recovery Trajectory

0–48 HRS

STABILIZE / RULE OUT DANGER

- Ensure safety
- Rule out life-threatening injury
- Baseline assessment
- Rest and symptom control
- Educate patient & family
- Plan for acute TBI

2–14 DAYS

VULNERABLE PHASE (PROTECT + GUIDE)

- Brain is vulnerable
- Protect from overexertion (cognitive, physical, emotional)
- Sleep, hydration, nutrition
- Light activity as tolerated
- Monitor symptoms
- Provide guidance and reassurance

2–6 WEEKS

ACTIVE RECOVERY

- Gradual return to activity
- Targeted rehab based on symptoms and goals
- Objective measures to track progress
- Adjust plan based on response
- Build resilience and capacity

>6 WEEKS

PERSISTENT PATHWAY (PRRSISTERS + TREAT ROOT CAUSES)

- Reassess: symptoms, function, sleep, and mood
- Identify underlying drivers
- Intensify and individualize treatment
- Address comorbidities
- Coordinate multidisciplinary care

Day 0 — Day 2 — Week 2 — Week 6+

WHY IT MATTERS:

- Aligns care with recovery phase
- Improves decisions and outcomes
- Prevents complications and setbacks
- Stronger clinic–patient team for teaching and trust

RIGHT CARE. RIGHT TIME. BETTER OUTCOMES. | BETTER CARE. BETTER LIVES.

THE 3 PILLARS OF CLINICAL THINKING

The framework is anchored in three core principles:

1 EARLY RECOGNITION

TBI is primarily a clinical diagnosis. **Early identification** based on mechanism, symptoms, and examination is critical, particularly given the limitations of imaging.

2 UNDERSTANDING BIOLOGY AND NETWORKS

TBI is a **disorder of brain function.**

- energy metabolism
- neural connectivity
- system regulation

This network-based perspective aligns with contemporary neuroimaging and connectome research.

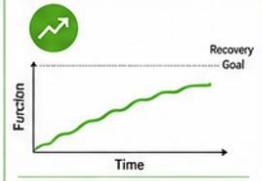
3 CARE BY CLINICAL TRAJECTORY

Recovery is not linear. Patients exhibit heterogeneous trajectories, requiring individualized, adaptive care strategies.

CLINICAL TRAJECTORIES

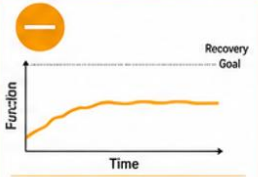
Recovery following TBI is unique to each patient.
Patients typically follow one of three trajectories:

IMPROVING



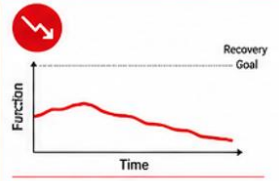
- Symptoms decrease
- Function improves
- Increased tolerance
- Progress toward goals

PLATEAUING



- Symptoms persist
- Limited improvement
- Functional status stable
- Risk of long-term limitation

WORSENING



- Symptoms increase
- Function declines
- Reduced tolerance
- Higher risk of chronic disability

Trajectory-based care ensures that treatment is continuously adapted based on patient response rather than predetermined timelines.

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3. Silverberg ND, Iverson GL. Is rest after concussion "the best medicine"? Recommendations for activity resumption following concussion in athletes, civilians, and military service members. *J Head Trauma Rehabil.* 2013;28(4):250–259.

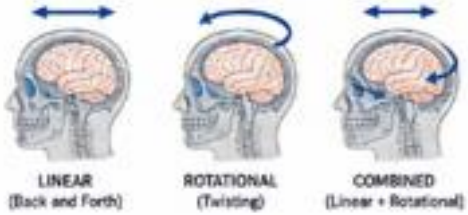
Using Concussion Clinical Trajectories to Inform Targeted Treatment Pathways

Risk Factors

- Previous Concussions
- Migraine
- LD/ADHD
- Sex
- Age
- Motion sensitivity, Ocular Hx?

Concussion

TYPES OF BRAIN MOVEMENT IN CONCUSSION



* Cervical needs to be evaluated for ligament damage especially upper cervical ligaments & facet capsular ligaments.

** Sleep Disturbances needs to be differentiated if primary or secondary to other subtypes.

Concussion Clinical Trajectories

- Vestibular
- Ocular
- Cognitive /Fatigue
- Migraine
- Anxiety/ Mood
- Cervical

Treatment and Rehab Pathways


Vestibular Therapy


Vision Therapy


Functional Testing / Cognitive Therapy


Headache Management


Behavioral Health Support


Cervical Therapy

Every concussion is unique. Identify the dominant clinical trajectory.
Target the right system. Treat the individual. Improve outcomes.

A BROKEN BRAIN IS NOT LIKE A BROKEN BONE.

WE NEED TO STOP TREATING IT LIKE ONE.

BROKEN BONE

STRUCTURAL DAMAGE
Visible on X-ray or CT.

STABLE & PREDICTABLE
Heals in a predictable timeline.

TREATMENT IS STANDARDIZED
Immobilize, allow time to heal, then rehabilitate.

OUTCOME IS EXPECTED
Most bones heal completely.

PROGRESS IS LINEAR
Healing follows a relatively straight path.

VS.

INJURED BRAIN

FUNCTIONAL DISRUPTION
Often invisible on standard images.

COMPLEX & UNPREDICTABLE
Affected by many biological, psychological, and social factors.

TREATMENT MUST BE INDIVIDUALIZED
Requires a personalized, multidisciplinary approach.

OUTCOME IS VARIABLE
Recovery can be incomplete and fluctuates over time.

PROGRESS IS NON-LINEAR
Recovery involves ups and downs, good days and bad.

The brain is a complex network, not a simple structure.
Healing is not just about time—it's about the right support, at the right time.

THE NEURO FRAMEWORK™

The 5 Daily Pillars of Brain Recovery After Concussion & TBI

SUPPORT HEALING | REDUCE SYMPTOMS | BUILD RESILIENCE | OPTIMIZE BRAIN HEALTH

N — NUTRITION

Fuel your brain.
Reduce inflammation.

Eat mostly plants: vegetables, berries, beans, nuts, seeds, whole grains, olive oil, and lean proteins.

- Supports brain energy, reduces inflammation, and promotes healing.
- Up to 53% risk reduction for cognitive decline

Feed healing. Protect your future.

E — EXERCISE

Move daily.
Restore and strengthen.

Daily movement improves blood flow, reduces stress, and supports brain repair.

- Daily sub-symptom aerobic activity (start small, build gradually)
- Strength/legs 3x per week as tolerated
- 40–47% risk reduction for cognitive decline

Stronger body. Stronger brain. Every step counts.

U — UNWIND

Calm your mind.
Find purpose.

Managing stress calms your nervous system and creates the conditions for healing.

- Breathwork, meditation, prayer
- Time in nature
- Journaling, gratitude, therapy
- Connect with what matters

Lower stress. Lift mood. Live with purpose.

R — RESTORATIVE SLEEP

Rest deeply.
Heal completely.

Quality sleep restores energy, clears brain waste, reduces inflammation, and strengthens memory.

- Aim for 7–8 hours of quality sleep each night
- Consistent sleep schedule
- Dark, cool, quiet environment
- Limit screens before bed

Deep sleep. Clear mind. Better tomorrow.

O — OPTIMIZE

Challenge your brain.
Stay connected.

Lifelong learning, social connection, and mental challenge build cognitive reserve and support neuroplasticity.

- Learn new skills
- Puzzles, reading, music
- Meaningful work or volunteering
- Build and nurture relationships

Keep learning. Stay social. Keep your brain young.

RECOVERY IS A PROCESS, NOT A RACE.

Small, consistent actions every day create lasting change.

Use the NEURO Framework daily to support your brain's healing and build a stronger, healthier future.

Eat well | Move often (within tolerance) | Calm down | Sleep deeply | Stay engaged

This framework complements medical care.

Always follow your healthcare provider's recommendations.

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Scope and Impact of TBI

I. General Scientific Principles

1. Traumatic brain injury is widely recognized in the peer-reviewed medical literature as a complex and heterogeneous condition affecting multiple neurological systems.[1]
2. TBI is not limited to a single moment of mechanical impact but initiates a cascade of secondary physiological processes, including metabolic disruption, neuroinflammation, excitotoxicity, and altered cerebral blood flow.[2]
3. These secondary processes may evolve over hours, days, months, or years following the initial injury and materially influence clinical outcome.[3]
4. The scientific literature supports the conclusion that TBI is appropriately conceptualized as a dynamic and evolving disease process rather than a static event.[4]

II. Diagnosis of Mild Traumatic Brain Injury

5. Mild traumatic brain injury (mTBI), also referred to as concussion, is a clinical diagnosis based on mechanism of injury, observed signs, reported symptoms, and clinical evaluation.[5]
6. The 2023 American Congress of Rehabilitation Medicine (ACRM) diagnostic criteria establish standardized, peer-reviewed, and consensus-based guidelines for the diagnosis of mTBI.[5]
7. These criteria do not require abnormal neuroimaging for diagnosis.[5]
8. The absence of findings on CT or MRI does not exclude the presence of brain injury or functional neurological impairment.[6]
9. Loss of consciousness is not required for diagnosis and occurs in a minority of concussion cases.[7]

III. Limitations of Traditional Severity Classification

10. The traditional classification of TBI as “mild,” “moderate,” or “severe” is based primarily on early clinical presentation and does not reliably predict long-term outcome.[3]
11. Patients classified as having “mild” TBI may nonetheless experience significant and prolonged impairment.[8]
12. Contemporary scientific frameworks incorporate multidimensional factors including clinical findings, biomarkers, imaging, and patient-specific modifiers.[9]

IV. Epidemiology and Public Health Burden

13. TBI represents a major public health condition, with hundreds of thousands of hospitalizations and tens of thousands of deaths annually in the United States.[10]
14. Many TBIs, particularly mild injuries, are not captured in hospital-based surveillance systems.[11]
15. Motor vehicle collisions and falls are among the most common mechanisms of TBI.[12]
16. Road traffic injuries are a leading cause of death globally, particularly among individuals aged 5–29 years.[13]

V. Persistence of Symptoms and Functional Impairment

17. Approximately 30% of adults with mTBI develop persistent post-concussive symptoms.[14]
18. More than half of patients with mTBI demonstrate incomplete functional recovery at six months.[15]
19. Approximately 47–53% of patients report ongoing functional limitations at one year following injury.[8]
20. Persistent symptoms may include cognitive, emotional, vestibular, sensory, and sleep-related dysfunction.[16]

VI. Prognostic Factors and Predictability

21. Recovery after mTBI is influenced by identifiable early clinical factors rather than occurring randomly.[14]
22. Acute cognitive symptoms, particularly difficulty concentrating, are among the strongest predictors of prolonged recovery.[14]
23. Premorbid psychiatric and sleep disorders significantly increase the likelihood of persistent symptoms.[14]
24. Loss of consciousness and amnesia are associated with increased risk of prolonged impairment.[14]
25. Female sex is associated with increased risk of persistent symptoms in multiple studies.[14]

VII. Mechanism of Injury and Motor Vehicle Collisions
26. Mechanism of injury is a clinically relevant factor in predicting outcome after TBI.[14]
27. Motor vehicle collisions are associated with higher odds of persistent symptoms compared with other mechanisms.[17]
28. Rapid acceleration–deceleration and rotational forces in MVCs are known to produce diffuse axonal strain.[18]
29. Brain injury can occur in the absence of direct head impact due to inertial forces.[18]
30. MVC-related concussion is associated with greater overall symptom burden and more severe affective symptoms than sport-related concussion.[19]

VIII. Symptom Burden and Chronicity in MVC-Related TBI
31. MVC-related concussion commonly presents with high prevalence of headache, anxiety, sensory sensitivity, and cognitive symptoms.[20]
32. Median symptom duration in MVC cohorts with persistent symptoms has been reported at approximately 30 months.[20]
33. Complete recovery in such cohorts is uncommon.[20]
34. Concussion and whiplash co-occur in a majority of MVC-related cases.[20]
35. Combined brain and cervical injury contribute to increased symptom complexity and prolonged recovery.[21]

IX. Functional and Occupational Impact
36. mTBI is associated with measurable impairment in daily functioning, including work and social participation.[22]
37. A significant proportion of patients remain unemployed or experience reduced income at one-year post-injury.[23]
38. Persistent symptoms are associated with reduced quality of life and long-term disability.[8]

X. Psychiatric and Neurobehavioral Sequelae
39. TBI is associated with increased rates of depression, anxiety, and post-traumatic stress disorder.[24]
40. PTSD is common following motor vehicle collisions and may persist for years.[25]
41. Psychiatric conditions following TBI are recognized neurobiological consequences of injury.[24]
42. TBI is associated with approximately a two-fold increased risk of suicide.[26]

XI. Long-Term Neurological Risks
43. TBI is associated with increased long-term risk of neurodegenerative disease, including Alzheimer's disease.[27]
44. Epidemiologic studies demonstrate increased dementia risk following head injury with dose-response relationships.[28]
45. TBI is associated with increased risk of stroke and cerebrovascular disease.[29]
46. TBI increases the risk of post-traumatic epilepsy, which may develop years after injury.[30]

XII. Chronic Disease Model
47. The contemporary medical literature supports classification of TBI as a condition with chronic potential rather than a purely acute injury.[4]
48. Long-term outcomes following TBI may include evolving neurological, psychiatric, and functional changes over time.[3]

Please see our book top 100 TBI studies for great research and summaries.

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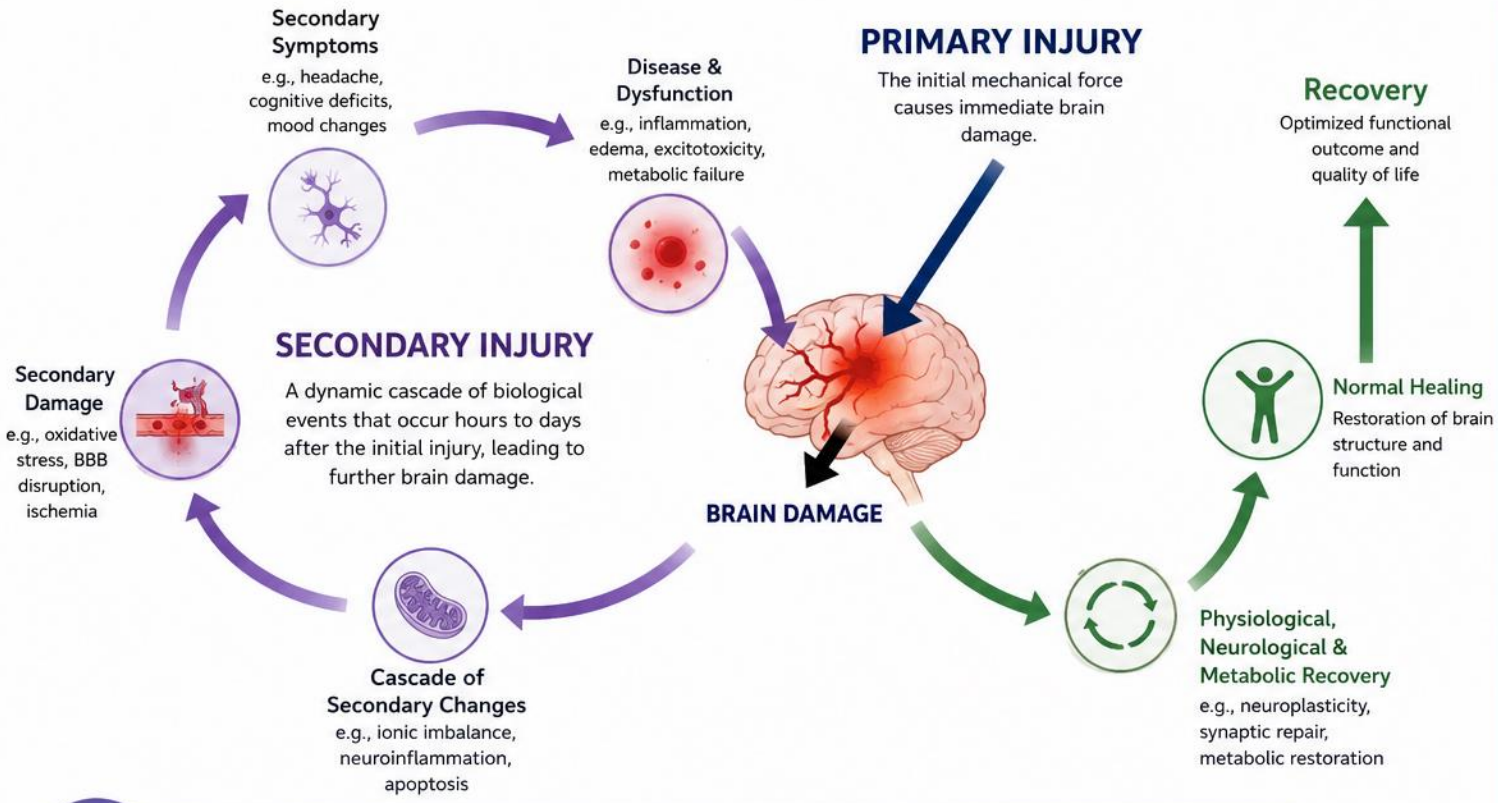
PRIMARY AND SECONDARY BRAIN INJURY

The continuum of injury, pathophysiology, and recovery



Secondary brain injury is a series of changes that can occur in the brain hours to days after an initial, or primary, brain injury. These changes can be cellular, chemical, tissue, or blood vessel related, and can lead to further damage to brain tissue.

KEY POINTS

- Primary injury is the immediate result of biomechanical force (e.g., impact, acceleration, deceleration).
- Secondary brain injury is a time-dependent cascade of molecular and cellular events that can worsen the initial damage.
- Targeting secondary injury processes offers a critical therapeutic window to improve recovery and long-term outcomes.

EXAMPLES OF SECONDARY INJURY PROCESSES

- Inflammation
- Excitotoxicity
- Oxidative stress
- Mitochondrial dysfunction
- Blood–brain barrier disruption
- Cerebral edema
- Metabolic dysfunction
- Cell death (apoptosis, necrosis)

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A New Paradigm for TBI Care

A Complete Framework for Concussion/TBI Care

10 CORE CLINICAL STEPS

Essential Early Clinical Priorities

1. Ensure Safety & Rule Out Life-Threatening Injury
2. Establish Diagnosis (History, Exam, Standardized Tools)
3. Identify Red Flags & Urgent Conditions
4. Screen for Risk Factors & Modifiers
5. Identify Symptom Patterns & Clinical Subtypes
6. Prevent Secondary Injury (Protect, Educate, Plan)
7. Initiate Early, Symptom-Guided Management
8. Provide Patient & Family Education (Set Expectations)
9. Document Baseline & Track Progress
10. Coordinate Multidisciplinary Care Early

7-PHASE CLINICAL CHECKLIST

Timeline of Care

1. **Phase 1: Initial Evaluation & Safety**
   Stabilize. Rule out emergencies. Confirm diagnosis. Establish baseline.
2. **Phase 2: Early Clinical Assessment**
   Identify symptom subtypes, risk factors, and clinical drivers.
3. **Phase 3: Early Management**
   Prevent secondary injury. Educate. Regulate sleep, activity, and symptoms.
4. **Phase 4: Targeted Rehabilitation**
   Address impairments with specific, system-based therapies.
5. **Phase 5: Functional Restoration**
   Gradual return to daily activities, school, work, and sport. Measure real-world function.
6. **Phase 6: Long-Term Management**
   Monitor, adapt, and address persistent symptoms. Optimize brain health.
7. **Phase 7: Collaborative Care**
   Ongoing communication across disciplines for whole-person recovery.

CLINICAL TRAJECTORIES

The Roadmap for Personalized Treatment

VESTIBULAR Trajectory	Vestibular Therapy
OCULAR Trajectory	Vision Therapy
COGNITIVE / FATIGUE Trajectory	Cognitive Therapy Functional Testing
MIGRAINE Trajectory	Headache Management
ANXIETY / MOOD Trajectory	Behavioral Health Support
CERVICAL Trajectory	Cervical Therapy

TOGETHER, THESE THREE ELEMENTS CREATE COMPLETE, COORDINATED, AND PERSONALIZED CARE.

Identify What Matters Early | Follow the Right Timeline | Treat the Right Systems

Better Decisions. Better Care. Better Outcomes.

THE 6 CLINICAL DRIVERS (EXECUTION LAYER)

Turning our 3 Pillars into measurable, targeted, and life-changing care.

1 OBJECTIVE MEASUREMENT

- Standardized symptom scales (PCSS)
- Cognitive testing (MoCA, ImPACT, etc.)
- Balance / vestibular testing
- Ocular-motor screening (VOMS)
- Autonomic assessment (HRV, etc.)

Measure to understand. Track to improve.

2 SUBTYPE CLASSIFICATION

- Cognitive / Fatigue
- Vestibular
- Ocular-Motor
- Headache / Migraine
- Cervical
- Mood / Anxiety
- Autonomic / Dysregulation

Identify the dominant drivers.
Treat the right problem.

3 RISK STRATIFICATION

- Prior concussion history
- Migraine / headache history
- Mental health history
- High initial symptom burden
- Mechanism of injury
- Age, sleep, stress, and social factors

Predict the trajectory.
Intervene early. Improve outcomes.

4 SECONDARY INJURY PREVENTION

- Optimize sleep
- Pacing & activity balance
- Nutrition & hydration
- Blood sugar stability
- Stress & autonomic regulation
- Avoid repeat injury
- Educate & empower

Protect the brain. Prevent setbacks.
Support the healing environment.

5 MULTIDISCIPLINARY CARE

- Vestibular PT
- Neuro-optometry
- Neuropsychology
- Behavioral health
- Cervical spine specialists
- Endocrinology (as indicated)
- Primary care coordination

No one discipline has all the answers.
Together, we get better outcomes.

6 RETURN-TO-LIFE PROGRESSION

- Return to school
- Return to work
- Cognitive load progression
- Physical activity progression
- Environmental modifications
- Full life participation

Recovery is more than symptom-free.
It's returning to the life that matters.

MEASURE. TARGET. PREVENT. COLLABORATE. PROGRESS.

BETTER CARE. BETTER OUTCOMES. BETTER LIVES.

THE WAY WE THINK ABOUT BRAIN INJURY HAS CHANGED

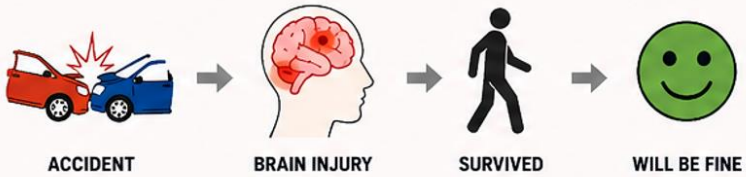
It's not just about survival. It's about what life looks like after.

OLD PARADIGM

The Outdated Thinking

IF THEY HAD A BRAIN INJURY BUT DID NOT DIE.

THEN PATIENT WILL BE FINE.



- Focuses only on survival
- Assumes no lasting problems if imaging is normal
- Ignores invisible and functional changes
- Dismisses patient symptoms
- Leads to underdiagnosis, undertreatment, and invalidation

SURVIVAL ≠ RECOVERY

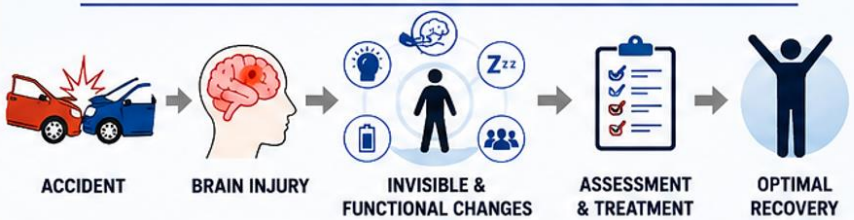
VS.

NEW PARADIGM

The Current Understanding

BRAIN INJURY IS COMPLEX. SURVIVAL IS JUST THE BEGINNING.

RECOVERY IS THE GOAL.



- Focuses on function, not just survival
- Recognizes that many changes are not visible on scans
- Understands the impact on thinking, emotions, sleep, energy, and daily life
- Validates symptoms and patient experience
- Uses early identification, treatment, and support to promote recovery and quality of life

SURVIVAL + UNDERSTANDING + SUPPORT = RECOVERY

WHY THIS MATTERS

- Up to 50% of people develop chronic problems after a brain injury[1]
- Many changes are invisible — standard imaging often appears normal[2]
- Early, evidence-based intervention improves long-term outcomes and reduces risk[3]
- Recovery is possible. The right care makes a real difference in people's lives[4]

CLINICAL IMPLICATIONS

- Look beyond the scan
- Listen and validate
- Assess broadly
- Treat early and individually
- Support recovery, function, and participation

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WE DON'T JUST TREAT INJURIES.
WE HELP PEOPLE REBUILD THEIR LIVES.

SEE IT. UNDERSTAND IT. HEAL IT.

CO-MANAGE WITH SPECIALISTS

WHY IT MATTERS

No single provider can manage all aspects of TBI.

REFERRAL TRIGGERS

- Symptoms persist or limit function
- Plateau or slow improvement
- Complex or multi-domain involvement
- Need for specialized testing or treatment
- Return-to-work / school / activity challenges
- Care coordination for optimal recovery

DOMAIN	SPECIALIST
VESTIBULAR	VESTIBULAR PT / NEURO-OTOLOGY
VISION	NEURO-OPTOMETRY / OPHTHALMOLOGY
COGNITIVE	NEUROPSYCHOLOGY
MOOD / PTSD	PSYCHOLOGY / PSYCHIATRY
CERVICAL	PT / SPINE SPECIALIST / CHIROPRACTOR
PERSISTENT SYMPTOMS	NEUROLOGY / PHYSIATRY

TEAM-BASED CARE • PATIENT-CENTERED • TARGETED TREATMENT • BETTER OUTCOMES

FACTORS ASSOCIATED WITH PERSISTENT SYMPTOMS AFTER mTBI

"**9 characteristics** were significantiy associated with symptoms persisting for 30 days: female sex; elevated body mass index; mechanism of injury; a prior diagnosis of headaches or migraines, depression, or anxiety; and the presence of focal neurological deficits, headache, or multiple computed tomography scans at intake."

These findings suggest that patients with any of these characteristics should be identified as candidates for early intervention intended to prevent persistent 30-day post concussive symptoms and should receive follow-up for mTBI."

"If the mechanism of injury was related to a fall, a vehicular crash, or abuse, the risk of having persistent symptoms was more than twice as high compared with other mechanisms of injury."

JAMA Network | Open.

Original Investigation | Emergency Medicine

Factors Associated With Persistent Symptoms Following Mild Traumatic Brain Injury

Yun K. Parke-Cock, MD; Damon Kuehl, MD; Ramon Diaz-Arrastia, MD, PhD; Jalee Vairamongkham, PhD; Chad M. Cannon, MD; Adam J. Singer, MD; Nazanin Mingh, MD; Nazanin Minshall, PhD, Justin Wueppen, DO, MEd; CBIST-A; Robert Gerwien, PhD

Abstract

IMPORTANCE Traumatic brain injury (TBI) is a common presentation in which it is clinically difficult at presentation to identify patients at risk for persistent symptoms, defined as lasting longer than 30 days. Few studies report the time period from injury to presentation; thus, it may be useful to determine early findings that identify patients who are likely to have persistent 30-day symptoms.

OBJECTIVE To identify parameters associated with persistent 30-day symptoms in adult emergency department (ED) patients presenting shortly after a mild TBI (mTBI).

DESIGN, SETTING, AND PARTICIPANTS This cohort analysis used the large and still enrolling HeadSMART II (Health Injury Serum Markers and Multi-modalities for Assessing Response to Trauma) data set. HeadSMART II began enrollment in 2021, and all patients with mTBI enrolled as of July 1, 2024, were included in this analysis.

EXPOSURE A diagnosis of mTBI, defined as a Glasgow Coma Scale score of 13 or higher.

MAIN OUTCOMES AND MEASURES The primary outcome was mTBI symptoms persisting 30 days after presentation. The 30-day Rivermead Post Concussion Symptoms Questionnaire was used to define persistent symptoms. Wilcoxon rank-sum testing was applied to continuous variables, and the Fisher exact test was applied to categorical variables.

RESULTS Overall, 803 HeadSMART II patients (median [IQR] age, 41.0 [27.0-57.0] years; 404 male [50.3%]) with 30-day follow-up data were assessed at a median (IQR) of 1.5 (0.7-10.6) hours after their injury. Most patients were employed (565 of 794 patients [71.2%]) and had a fall or head struck by object as the mechanism of injury (387 of 802 patients [48.3%]). Trauma above clavicle (279 of 402 men [69.4%] vs 231 of 398 women [58.0%]) and other presence of fracture (103 of 403 men [25.6%] vs 60 of 396 women [15.2%]) or laceration (166 of 404 men [38.6%] vs 94 of 398 women [23.6%]) occurred more often in men than in women, whereas headaches occurred more often in women than in men (338 of 398 women [84.9%] vs 134 of 401 men [78.3%]). Over time, TBI symptoms declined for all. The presentation characteristics associated with persistent 30-day symptoms included female sex (odds ratio [OR], 2.09; 95% CI, 1.46-2.87), elevated body mass index (ie, 26-26.9, 10.3; 2.28-7.67), a vehicular crash (OR, 3.79; 95% CI, 1.68-10.19), and abuse (OR, 3.67; 95% CI, 1.43-10.73); a prior diagnosis of headaches or migraines (OR, 2.76; 95% CI, 1.94-3.92), depression (OR, 2.55; 95% CI, 1.36-4.77), or anxiety (OR, 2.35; 95% CI, 1.36-4.07) and the presence of focal neurological deficits, headache, or multiple computed tomography scans at intake.

Key Points

Question What are the early clinical characteristics associated with persistent symptoms 30 days after mild traumatic brain injury (mTBI)?

Findings In this cohort study of 803 patients presenting at a median of 1.5 hours after an mTBI in Glasgow Coma Scale score ≥13, 9 characteristics were significantly associated with symptoms persisting for 30 days: female sex; elevated body mass index; mechanism of injury; a prior diagnosis of headaches or migraines, depression, or anxiety; and the presence of focal neurological deficits, headache, or multiple computed tomography scans at intake.

Meaning These findings suggest that patients with any of these characteristics should be identified as candidates for early intervention intended to prevent persistent 30-day post concussive symptoms and should receive follow-up for mTBI.

+ Supplemental content

Author affiliations and article information are listed at the end of this article.

Table 3. If the mechanism of injury was related to a fall (OR, 2.87; 95% CI, 1.28-7.67), a vehicular crash (OR, 3.79; 95% CI, 1.68-10.19), or abuse (OR, 3.67; 95% CI, 1.43-10.73), the risk of having persistent symptoms was **more than twice as high** compared with other mechanisms of injury.

REFERENCES

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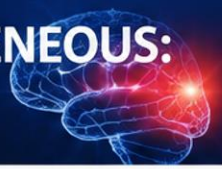
CONCUSSIONS ARE HETEROGENEOUS: *Mechanism Matters*



> Medical practitioners and individuals experiencing a concussion should know that concussions are heterogeneous within and across various mechanisms.

Motor vehicle crash concussion mechanism displays a greater total number of symptoms and greater affective symptom severity but no neurocognitive differences compared with sports-related concussion mechanism.

KEY TAKEAWAYS

- Concussions are **heterogeneous** within and across mechanisms.
- Mechanism of injury **influences** symptom burden and affective symptom severity.
- **No neurocognitive differences** were found between motor vehicle and sports concussion mechanisms.
- Clinical evaluation should consider **mechanism-specific** symptom profiles.

Understanding mechanism-specific effects supports more **accurate assessment** and **targeted management** of individuals with concussion.

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APPLIED NEUROPSYCHOLOGY: ADULT
https://doi.org/10.1080/23279095.2022.2196522

Check for updates

Motor vehicle crash concussion mechanism displays a greater total number of symptoms and greater affective symptom severity but no neurocognitive differences compared with sport-related concussion mechanism

Eric J. Shumski[a], Melissa N. Anderson[b], Julianne D. Schmidt[a], and Robert C. Lynall[a]

[a]UGA Concussion Research Laboratory, Department of Kinesiology, Ramsey Student Center, University of Georgia, Athens, GA, USA; [b]Department of Kinesiology and Applied Physiology, University of Delaware, Newark, DE, USA

ABSTRACT

Previous research among adolescents has shown differences in symptoms and neurocognitive performance between sport-related (SRC) and motor vehicle crash (MVC) concussions mechanisms. Limited research has focused on young adults. The purpose of our study was to compare symptoms, balance, and neurocognitive performance between SRC and MVC mechanisms in young adults. Forty-three (58.1% female, age = 25.3 ± 2.5 years), ages since concussion = 128 ± 127, and 26 (76.9% female, age = 24.1 ± 5.6 years, days since concussion = 125 ± 83) individuals with an SRC and MVC mechanism, respectively, participated. Primary outcome mesaures included the total number, severity, cluster (sustained attention/concentration, migraine, lethargy), and affective (positive and negative affect). Consssio are subgroups of symptoms used for targeted rehabilitation. We used independent t-tests and Mann-Whitney U tests to compare symptoms, BESS, and neurocognitive performance. Cliff's Delta effect size was interpreted as negligible (<0.15), small (0.15–0.33), medium (0.34–0.47), and large (≥0.48). There were no group differences for any demographic factors or preexisting conditions (age range = 0.112-0.991). Participants with an MVC mechanism reported a greater number of total post-concussion symptoms (p = 0.025), Cliff's Delta = 0.321) and a more severe affective symptom cluster (p = 0.010, Cliff's Delta = 0.37). There were no group differences for BESS or neurocognitive performance after correcting for multiple comparisons. The MVC mechanism cohort resulted in a greater total symptom burden relative to the SRC mechanism. Medical practitioners and individuals experiencing a concussion should know that concussions are heterogeneous within and across various mechanisms.

KEYWORDS

Adults; affective; car crash; concussion; mechanism; neurocognition; mild traumatic brain injury

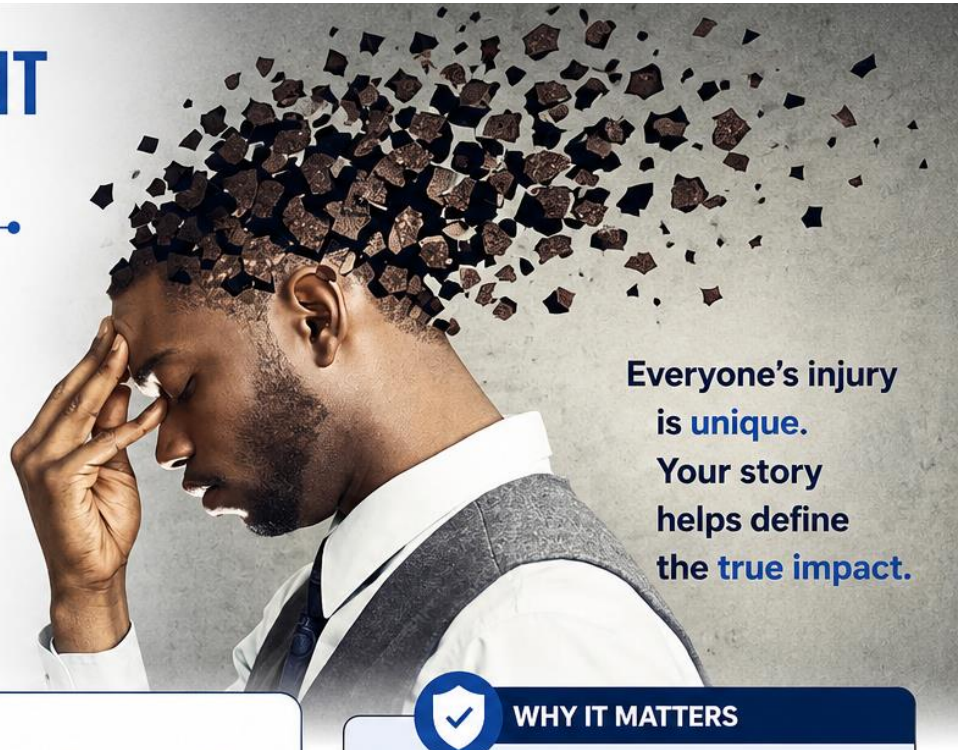
REFERENCE

Shumski EJ, Anderson MN, Schmidt JD, Lynall RC. Motor vehicle crash concussion mechanism displays a greater total number of symptoms and greater affective symptom severity but no neurocognitive differences compared with sport-related concussion mechanism. Appl Neuropsychol. 2023;30(4):411–420. doi:10.1080/23279095.2022.2196522.

UNDERSTANDING IMPAIRMENT AND DISABILITY

IMPAIRMENT is the permanent loss to the body physically and/or mentally.
What was taken away from you?

DISABILITY is when a physical or mental impairment substantially limits one or more major life activity.



Everyone's injury is unique. Your story helps define the true impact.

EXAMPLES OF MAJOR LIFE ACTIVITIES*

- Walking
- Speaking
- Learning
- Working
- Caring for oneself
- Interacting with others
- Seeing
- Hearing

*As defined by the Americans with Disabilities Act (ADA).

WHY IT MATTERS

- ✓ Accurate assessment leads to proper care.
- ✓ Recognition supports access to services.
- ✓ Your experience is real, valid, and important.
- ✓ Understanding today can improve tomorrow.

REFERENCES

1. Americans with Disabilities Act of 1990, 42 U.S.C. §§ 12101–12213.
2. World Health Organization. International Classification of Functioning, Disability and Health (ICF). Geneva: WHO; 2001.
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Impairment is the loss.
Disability is the impact on life.

Listening to your story is the first step toward meaningful recovery.

PRINCIPLE 1

TELL A STORY

See the person. Understand the impact.

Numbers and scans don't capture the whole picture.
A patient's story reveals what the injury changed—and what recovery means.

- How is the patient different?
- What have they lost?
- What did they overcome?
- Talk with others.

> *Behind every diagnosis is a unique life. Listening to the story is the first step to meaningful care.*

F Functional
O Occupational
R Recreational
D Dreams

Impairment Ratings
What changed biologically and neurologically.

Disability Exams
How the injury affects daily life and functioning.

Life Care Plans
What is needed for today and for the future.

Explaining Pathology
Connecting the medical findings to real-world impact.

WHY THE STORY MATTERS

- Guides accurate assessment and diagnosis.
- Supports targeted, individualized treatment.
- Strengthens communication and shared decisions.
- Improves outcomes and quality of life.

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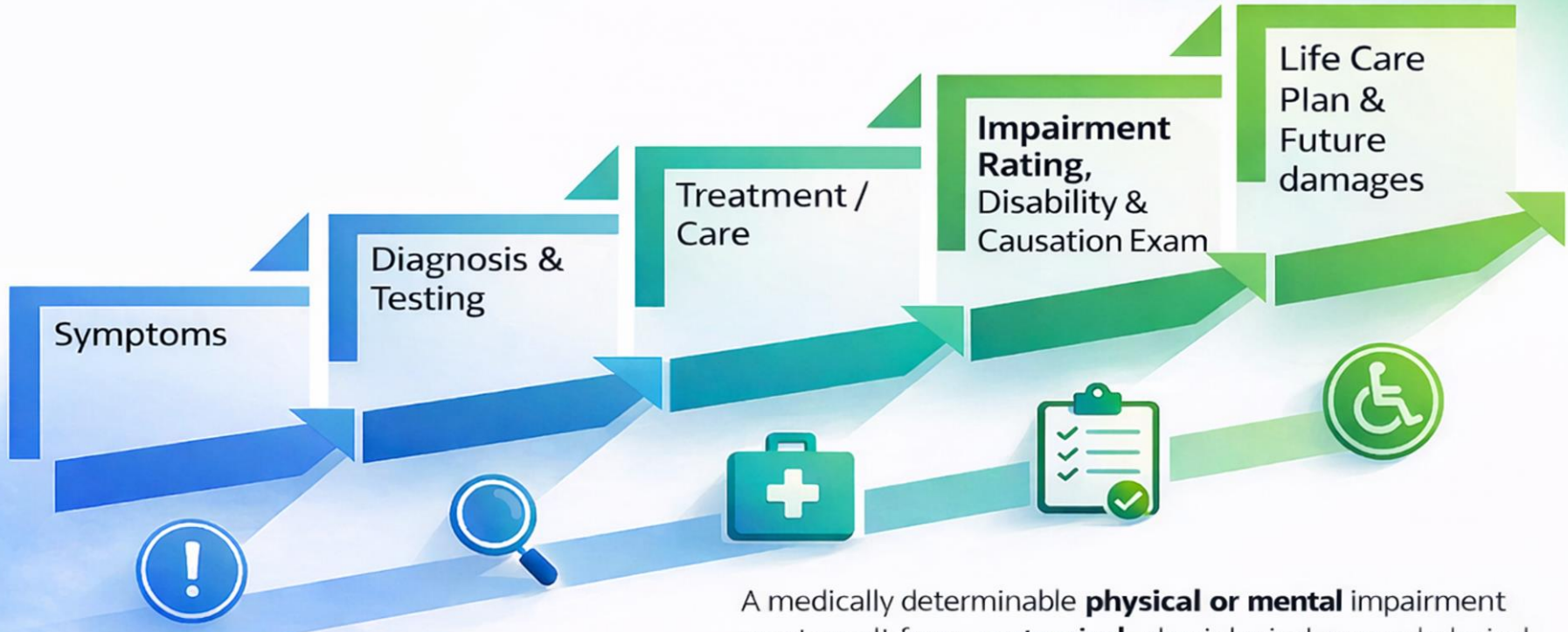
SERIOUS INJURY & TBI DOCUMENTATION



A medically determinable **physical or mental** impairment must result from **anatomical**, physiological, or psychological abnormalities which can be shown by medically **acceptable clinical and laboratory diagnostic techniques.**

****In such cases, one** can usually **anticipate future functional decline** based on the natural history of the disease process. *

Impairment assessment is a necessary first step for determining disability.

American Medical Association: Guides to the Evaluation of Permanent Impairment, fifth edition. Chicago, American Medical Association, 2001

RESTORING HOMEOSTASIS AFTER TBI

The goal of recovery is not just recovery from injury,
but restoration of balance, regulation, and resilient brain function.

TIMING LAYER:

- **0–48 HOURS** — Stabilization & Protection
- **2–14 DAYS** — Vulnerability Window (Prevent Secondary Injury)
- **2–6 WEEKS** — Recovery Trajectory
- **>6 WEEKS** — Persistent Pathway (Targeted Intervention Required)

AFTER TBI: HOMEOSTASIS IS DISRUPTED

NEUROINFLAMMATION
Activation of microglia and cytokines disrupts cellular balance and signaling.

CEREBRAL PERFUSION
Dysregulated blood flow and impaired autoregulation reduce oxygen and nutrient delivery.

NEUROTRANSMITTER IMBALANCE
Disrupted signaling of dopamine, serotonin, GABA, glutamate, and acetylcholine.

MITOCHONDRIAL DYSFUNCTION
Impaired energy production and increased oxidative stress lead to cellular fatigue.

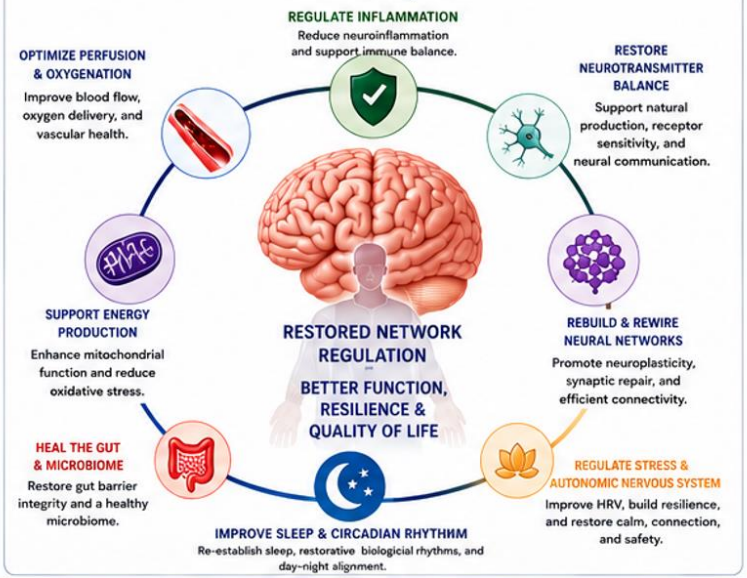
GUT–BRAIN DYSREGULATION
Altered microbiome, intestinal permeability, and immune activation influence the brain.

SLEEP & CIRCADIAN DISRUPTION
Poor sleep quality and circadian misalignment impair healing and cognitive performance.

STRESS & AUTONOMIC IMBALANCE
Sympathetic overdrive and poor HRV impair regulation, mood, and recovery.

RESTORING HOMEOSTASIS

Recovery happens when the body and brain are supported in re-establishing balance across interconnected systems.



THE PATH TO RESTORATION

A personalized, multi-system approach creates the conditions for healing.

ASSESS COMPREHENSIVELY
Identify root causes and imbalances across all systems.

PRIORITIZE & PERSONALIZE
Focus on the biggest disruptors and build an individualized plan.

SUPPORT & STABILIZE
Address foundational needs: inflammation, sleep, energy, nutrition, stress, and safety.

TRAIN & REBUILD
Use targeted therapies, cognitive training, movement, and graded exposure to rebuild capacity.

REINTEGRATE & OPTIMIZE
Strengthen neural networks and daily function. Support purpose, connection, and performance.

MONITOR & ADAPT
Track progress, adjust the plan, and continue advancing toward long-term resilience.

TBI & CONCUSSION: THE FACTS

- **69 MILLION** — People worldwide sustain a TBI annually, the majority are mild (mTBI).[1]
- **53%** — of individuals report persistent symptoms at 1 year after mTBI.[2]
- **UP TO 30%** — develop persistent post-concussion symptoms (PPCS).[3]
- **WOMEN** — are at higher risk for prolonged recovery and PPCS.[4]
- **>50%** — of TBIs go unreported and untreated.[5]
- **$76.5 BILLION** — Estimated annual economic impact of TBI in the U.S.[6]

GUIDING PRINCIPLES

- The brain is dynamic and capable of change.
- Small, consistent steps drive meaningful recovery.
- Treat the whole person, not just the injury.
- Empower the body to heal.
- Measure what matters. Adjust. Repeat.

MODIFIABILITY

Primary Injury	Not reversible
Secondary Processes	Modifiable
Tertiary Outcomes	Influenced with treatment

RESTORE BALANCE. REBUILD CONNECTIONS.

RECLAIM LIFE.

When the body and brain are in sync, the path back into balance, symptoms improve, function returns, and quality of life is restored.

BETTER OUTCOMES

- IMPROVED COGNITION
- BETTER MOOD & EMOTIONAL REGULATION
- INCREASED ENERGY & RESILIENCE
- RETURN TO LIFE, WORK & PURPOSE

The injury disrupts regulation. Recovery depends on whether regulation is restored.
We cannot change what happened. But we can change what happens next.

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4. Iverson GL, Gardner AJ, Terry DP, et al. Predictors of clinical recovery from concussion: a systematic review. Br J Sports Med. 2017;51(12):941–948.
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FOR MORE INFORMATION

Scan to access resources and research.

BrainCussion
BRAIN INJURY AWARENESS

Neuro360
Where Every Connection Matters

TBI CHECKLIST FOR PROVIDERS

A concussion is a mild, traumatic brain injury (TBI). We know it is not "mild" when you are the person that just received the injury. It is usually caused by a bump, blow, or jolt to the head that results in the normal function of the brain being altered for a period of time. This checklist will assist with the continuum of care to "screen" (an extended period of unconsiousness or memory loss after the injury). This checklist will help you better recognize the signs/symptoms of a TBI. The information should be shared immediately with the client's treating health care providers should you suspect a TBI has occurred so they can be put through the BrainCussion system for further evaluation.

Wreck Review:

- ☐ Extensive property damage
- ☐ Airbag deployment
- ☐ T-bone
- ☐ High speed impact
- ☐ Multiple impacts
- ☐ Head hit anything?
- ☐ Steering wheel
- ☐ Headrest
- ☐ Side window
- ☐ Windshield
- ☐ Flying debris/object inside vehicle

Symptom Review:

- ☐ Loss of consciousness
- ☐ Any headaches
- ☐ Confusion
- ☐ Disoriented
- ☐ Irritability
- ☐ Dizziness
- ☐ Blurred vision
- ☐ Past history of TBI
- ☐ Sensitivity to light
- ☐ Nausea
- ☐ Vomiting
- ☐ Slurred Speech
- ☐ Fatigue
- ☐ Fogginess
- ☐ Ringing in the ears

Delayed Symptoms:

- ☐ Memory problems
- ☐ Difficulty concentrating
- ☐ Sleep impairment
- ☐ Problems with senses (taste, smell, vision)
- ☐ Balance issues
- ☐ Changes in mood
- ☐ Crying/emotional swings

EARLY IDENTIFICATION. PROMPT ACTION. BETTER OUTCOMES.
Use this checklist at every visit when a head injury is suspected.
Timely recognition and referral can make a lasting difference.

RECOGNIZE. DOCUMENT. | REFER. COLLABORATE. | SUPPORT. EMPOWER. | IMPROVE OUTCOMES.

TRUSTED RESOURCES FOR • BRAIN INJURY EDUCATION & SUPPORT •

BRAINSTRAIN.COM
SCIENCE. EXPERIENCE. COMPASSION. BETTER ANSWERS. BETTER OUTCOMES.
Evidence-based education, resources, and support to help patients and families navigate brain injury recovery.
brainstrain.com

facetinjury.com
Comprehensive information on facet injuries, treatments, and recovery.
facetinjury.com

INJURYUNIVERSITY.COM
Advanced training and certification for professionals in personal injury care.
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Helping providers understand impairment ratings and causation determination.
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Dr. Connelly's cell: 678-200-7587