

Epidemiology of Brain Injury in the DOC

Indiana DOC and Brain Injury Conference
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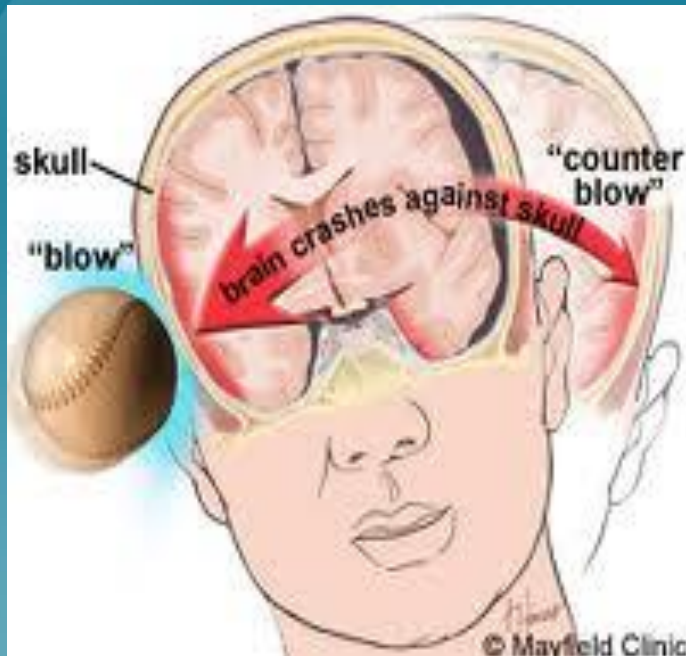


First, What is TBI?

Traumatic Brain Injury (TBI)

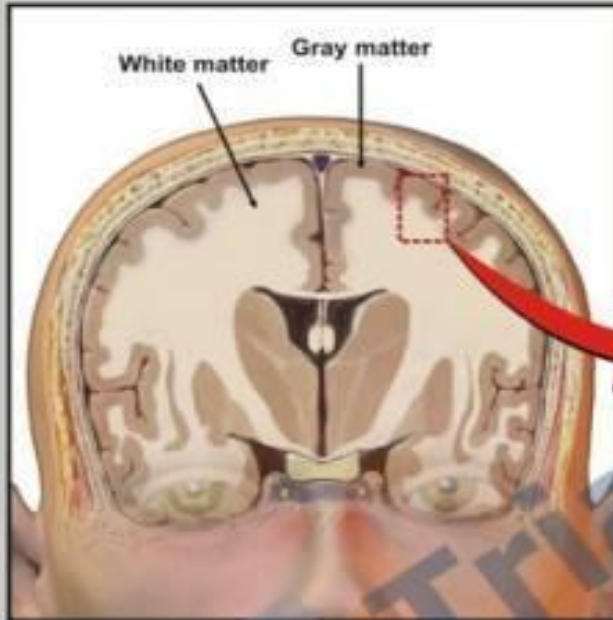
- “TBI occurs when an external mechanical force causes brain dysfunction.” (Mayo Clinic)
- **“Traumatic brain injury (TBI) is a nondegenerative, noncongenital insult to the brain from an external mechanical force, possibly leading to permanent or temporary impairment of cognitive, physical, and psychosocial functions, with an associated diminished or altered state of consciousness.”**

Mechanisms of Traumatic Injuries

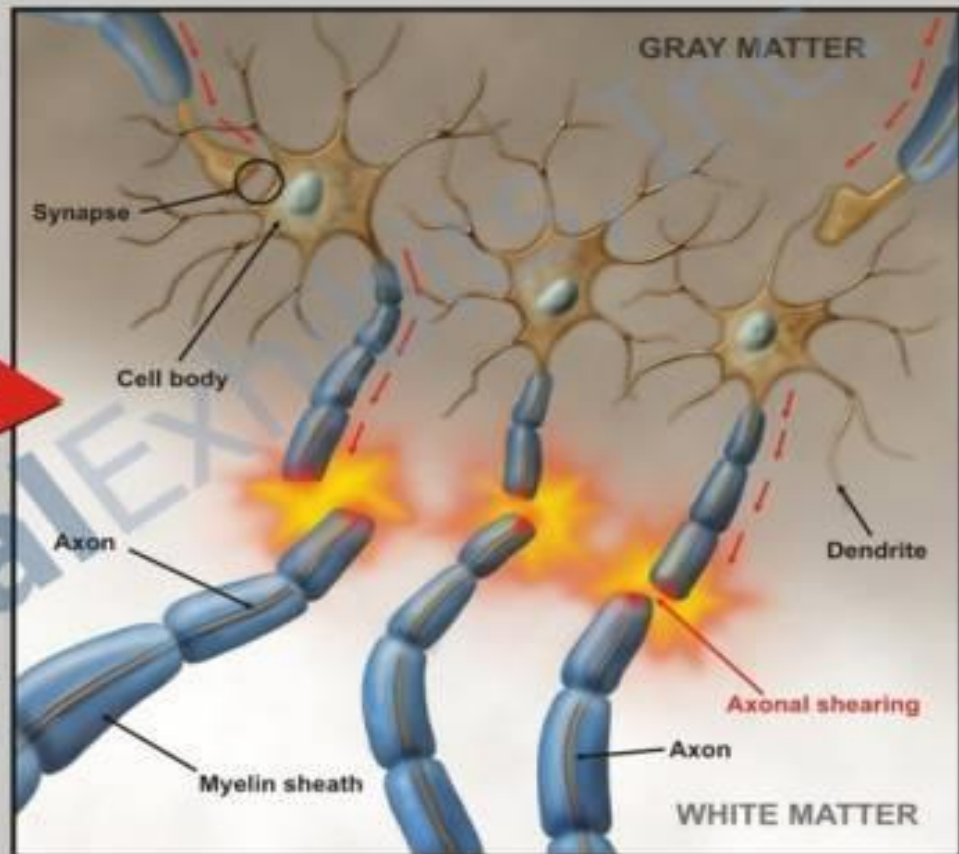


- Diffuse Axonal Injury
- Subdural Hematoma
- Intracerebral Hemorrhage
- others

DIFFUSE AXONAL INJURY

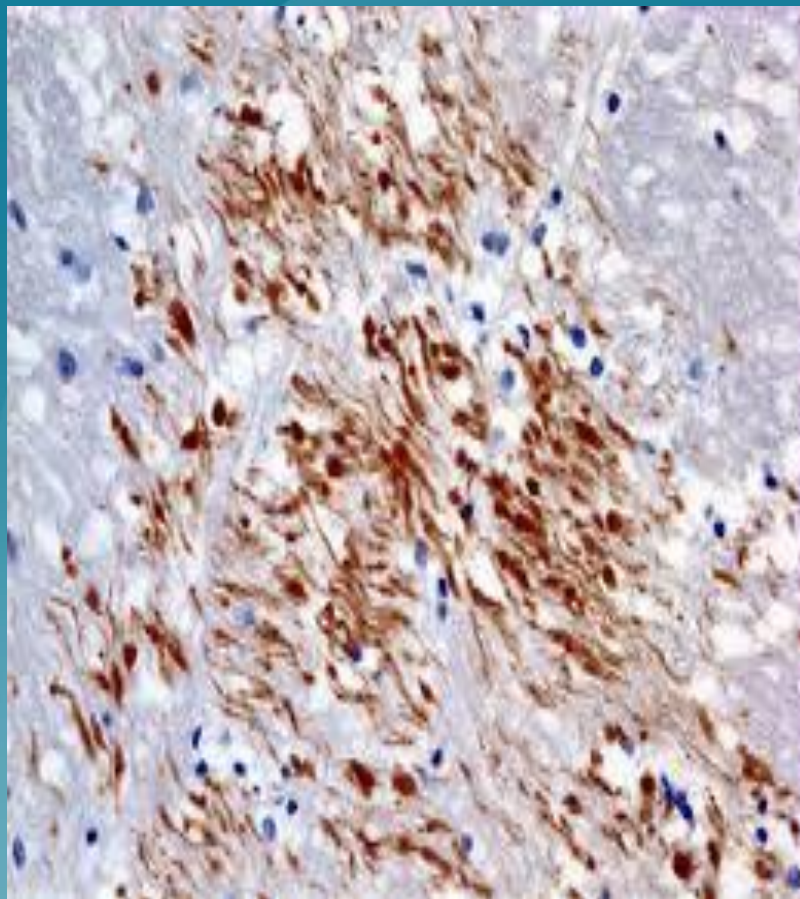


Sudden acceleration-deceleration forces cause injury to the brain.



The injury is greatest in where the density difference is greatest.
Most tearing occurs at the gray-white matter junction.

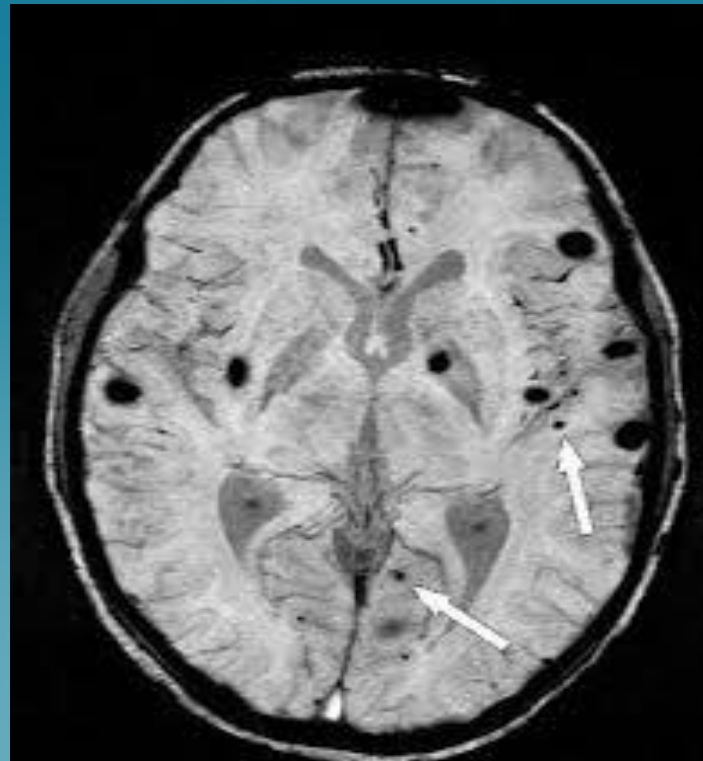
Histology



Pathology



MRI Imaging

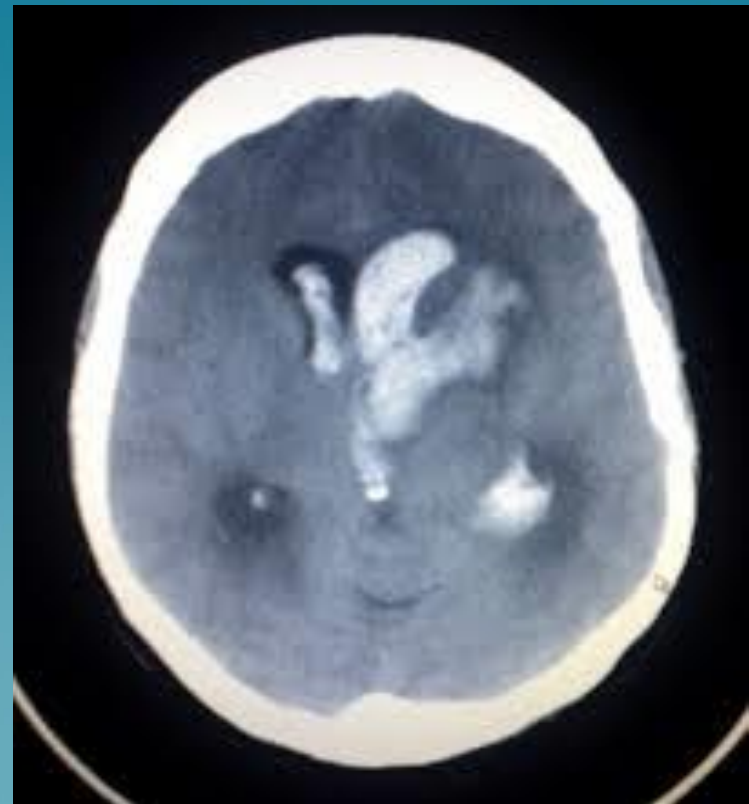


Other TBI Mechanisms

Subdural Hematoma



Intracerebral Hematoma



Severity of TBI

	Mild	Moderate	Severe
Imaging	Normal	Normal / Abnormal	Normal / Abnormal
LOC	0-30 minutes	> 30 minutes < 24 hours	> 24 hours
AOC	A moment up to 24 hours	> 24 hours	Severity based on other criteria
PTA	0-1 day	> 1 and < 7 days	> 7 days
GCS	13-15	9-12	3-8

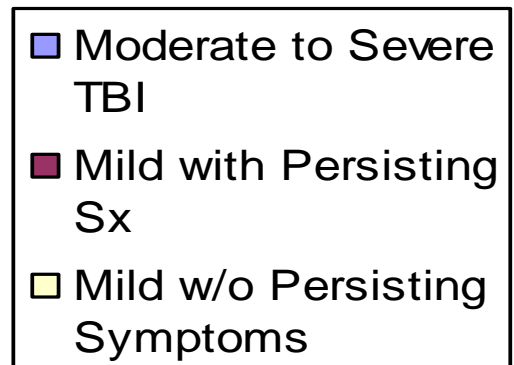
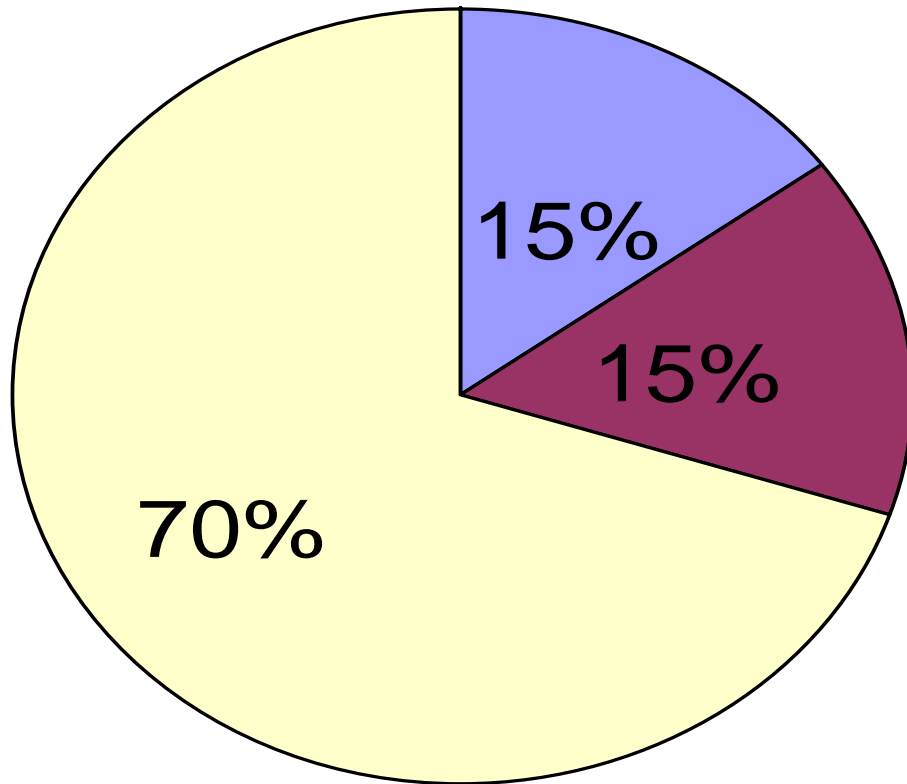
Classification based on 2009 VA/DoD Clinical Practice Guidelines for Management of Concussion/Mild Traumatic Brain Injury

*LOC = loss of consciousness

*AOC = alteration of consciousness / mental state

*PTA = post-traumatic amnesia

*GCS = Glasgow Coma Scale



Consequences of TBI

- Basic cognitive skills may be disrupted:
 - Sustaining attention
 - Concentrating on tasks at hand
 - Remembering newly learned material
 - Processing of information
 - Solving problems / making decisions
- Neurobehavioral changes are common:
 - Decreased inhibition and impulsivity
 - Difficulty with initiation
 - Diminished awareness of weaknesses / limitations
 - Social inappropriateness

Consequences of TBI

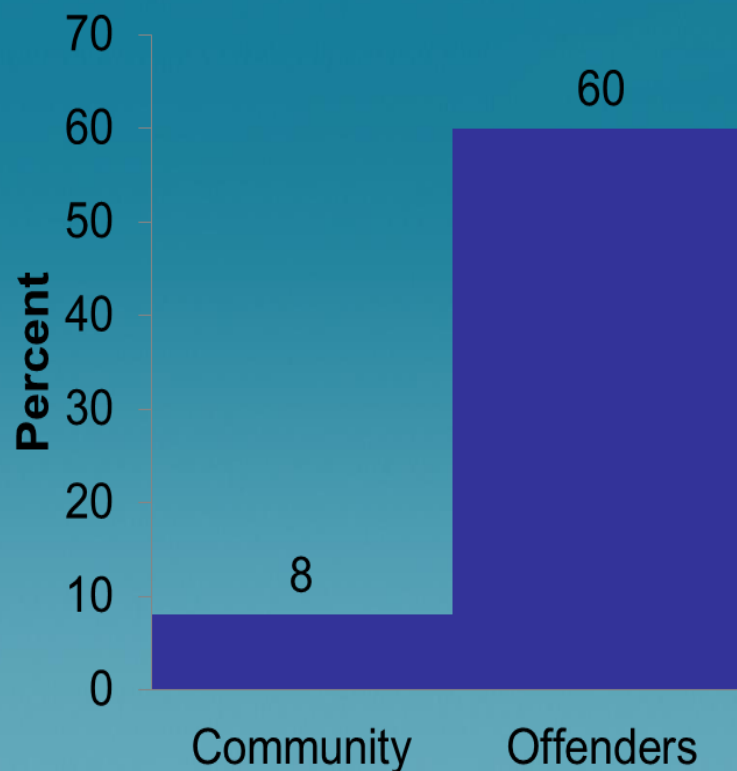
- Possible emotional & social consequences:
 - Increased irritability / aggression
 - Depression & anxiety
 - Mood lability
 - Social withdrawal
- Can also experience physical & other medical complications related to the TBI
- 6 Learning Modules developed for the IDOC on brain injury will be rolled-out January 2016



Prevalence

Meta-analysis of 20 epidemiological studies found 60% of offenders had history of TBI ¹

Compared to 8.5% of people in the community ²



1. Shiroma, Ferguson, & Pickelsimer (2012). *J. Correctional Health Care*, 16 (2), 147-159.

2. McGuire, Burrigh, Williams, & Donovick (1998). *Brain Injury*, 12(3), 207-214.

Relationship Between TBI and Incarceration

- 7% of survivors of severe TBI had had legal involvement within 1 year after the injury.¹
- By 5 years after the head injury, 31% had legal involvement.¹
- 24% of subjects with TBI had committed crimes leading to arrests within a 2-year period.²

1. Brooks, Campsie, Symington, Beattie, McKinlay (1986). *J Neurol Neurosurg Psychiatry*, 49 (7), 764–770.

2. Hall, Karzmark, Stevens, Englander, O'Hare, Wright (1994). *Arch Phys Med Rehabil*, 75 (8) (1994), pp. 876–884

83% reported sustaining a TBI
before their initial involvement
with the criminal-justice

Sarapata, Herrmann, Johnson, Aycock (1998). *Brain Injury*, 12 (10),
821–842

TBI is a Significant Risk Factor for Incarceration!

Indiana Research





Prevalence – Indiana

Ray, Sapp, Kincaid (2014). *J of Forensic Sciences*, 59(5), 1248-1253.

- Screening conducted by trained RDC Intake Specialists
- 831 male offenders were screened at RDC during a one month period using the OSU-TBI-ID
- **35.7%** of those screened reported experiencing a TBI at some point in their lifetime
- 20% Mild TBI; 10% Moderate or Severe TBI
- Inmates with history of TBI were 1.5 times more likely to have prior arrest

Indiana DOC HRSA Grant

(2014-2018)

- **Goals:** Improve Return to Work and Decrease Return to Incarceration through Resource Facilitation
- **DOC Grant Director:** Frances Osburn
- **Target Population:** Moderate to Severe TBI
- **Partners:**
 - Rehabilitation Hospital of Indiana (Peter Bisbecos, JD, Devan Parrott, MS)
 - PACE (Rhiannon Edwards, MS, Alicia McKay, Lynise Beard)
 - Community Solutions (Lena Hackett and Lisa Osterman)
 - American Institute of Research (Roger Jarjoura, PhD and Konrad Haight)

Indiana DOC HRSA Grant: Phase 1 Results

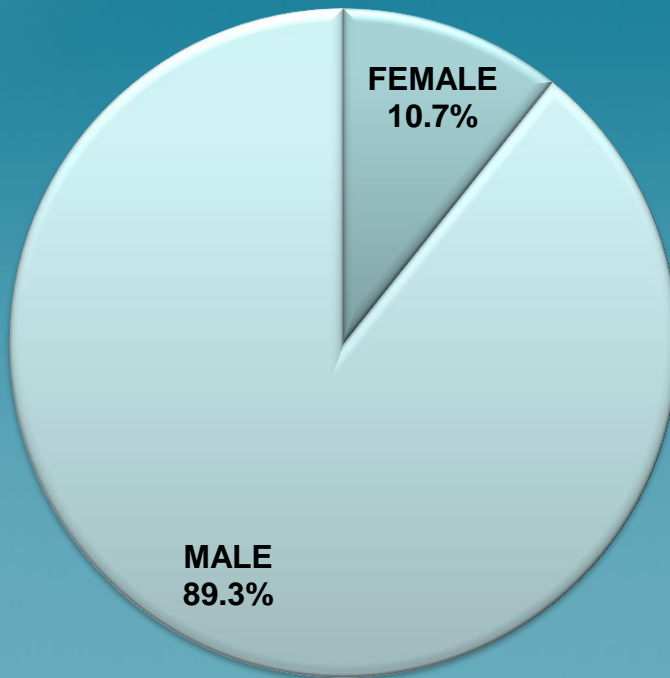
- Goal: screen all Marion County parolees and all residents at the Duvall Residential Facility who participate in PACE
- 1,354 Screenings for TBI in 5 months (Jan. – May 2015)
- 28 Screeners conducted the interviews
- **Note:** Drew Adams, IDOC has been a terrific champion of the project leading the screening process

Prevalence of Moderate to Severe TBI

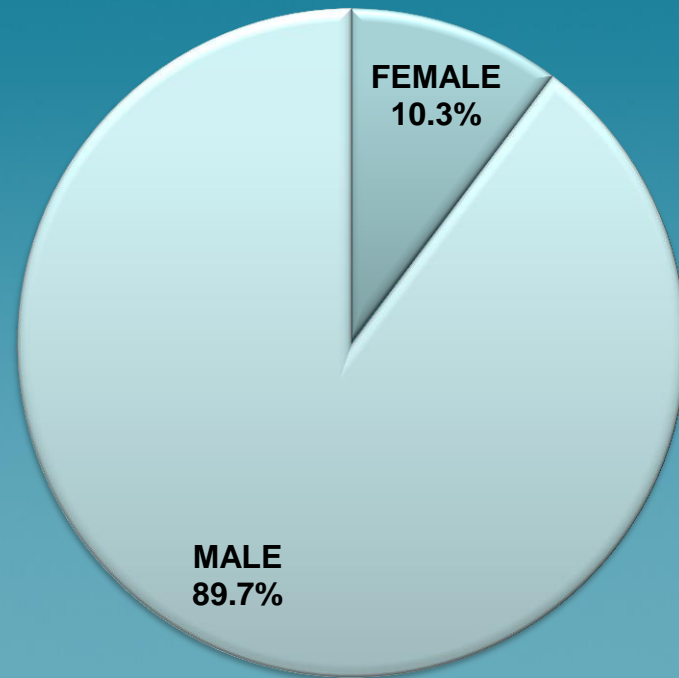
- 1,354 screenings resulted in the identification of **149 (11%)** participants with a possible moderate to severe TBI

Participant Gender

All Screened

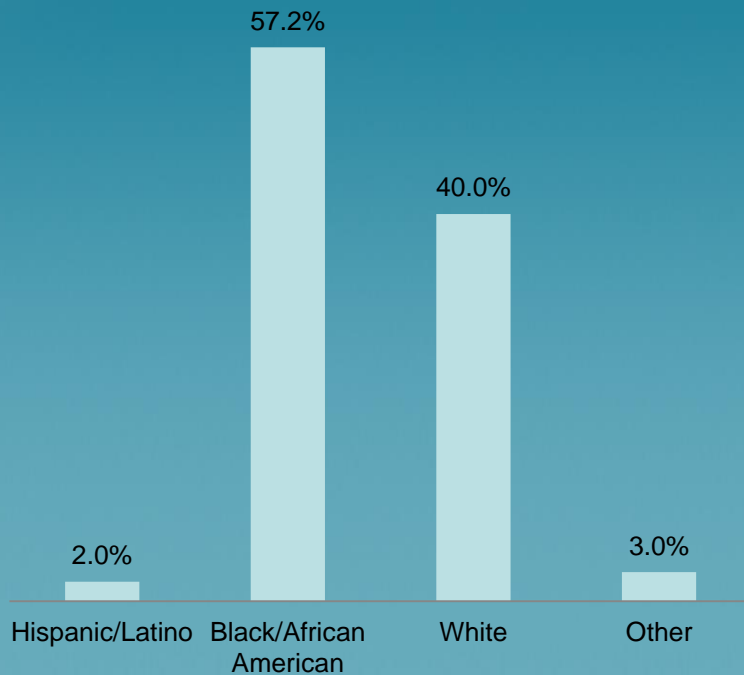


With Possible TBI

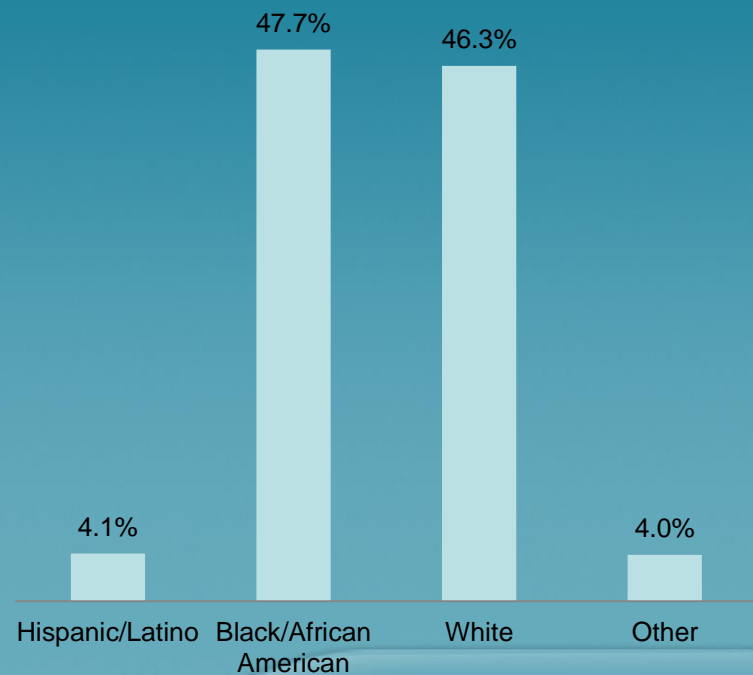


Participant Race/Ethnicity

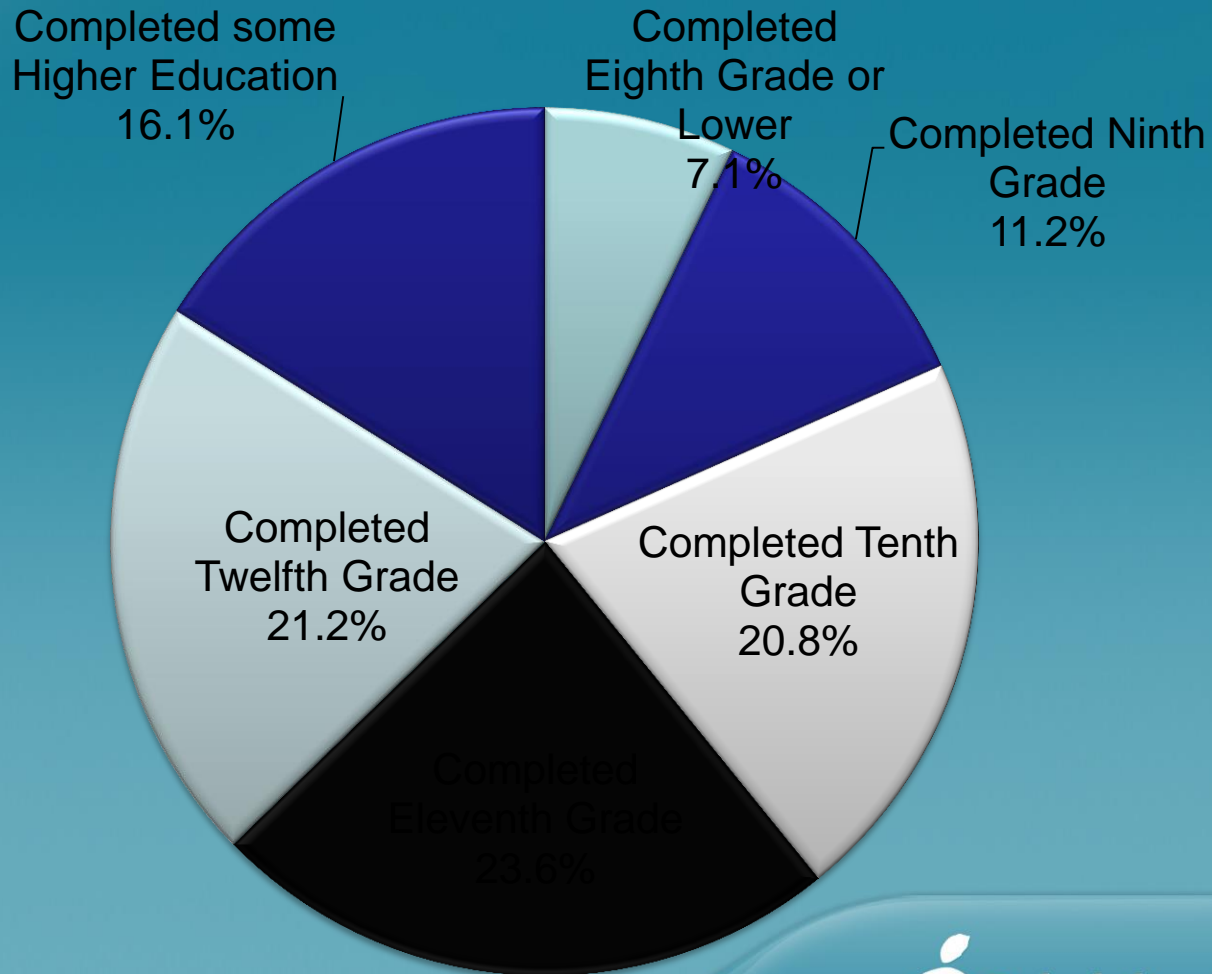
Total Sample



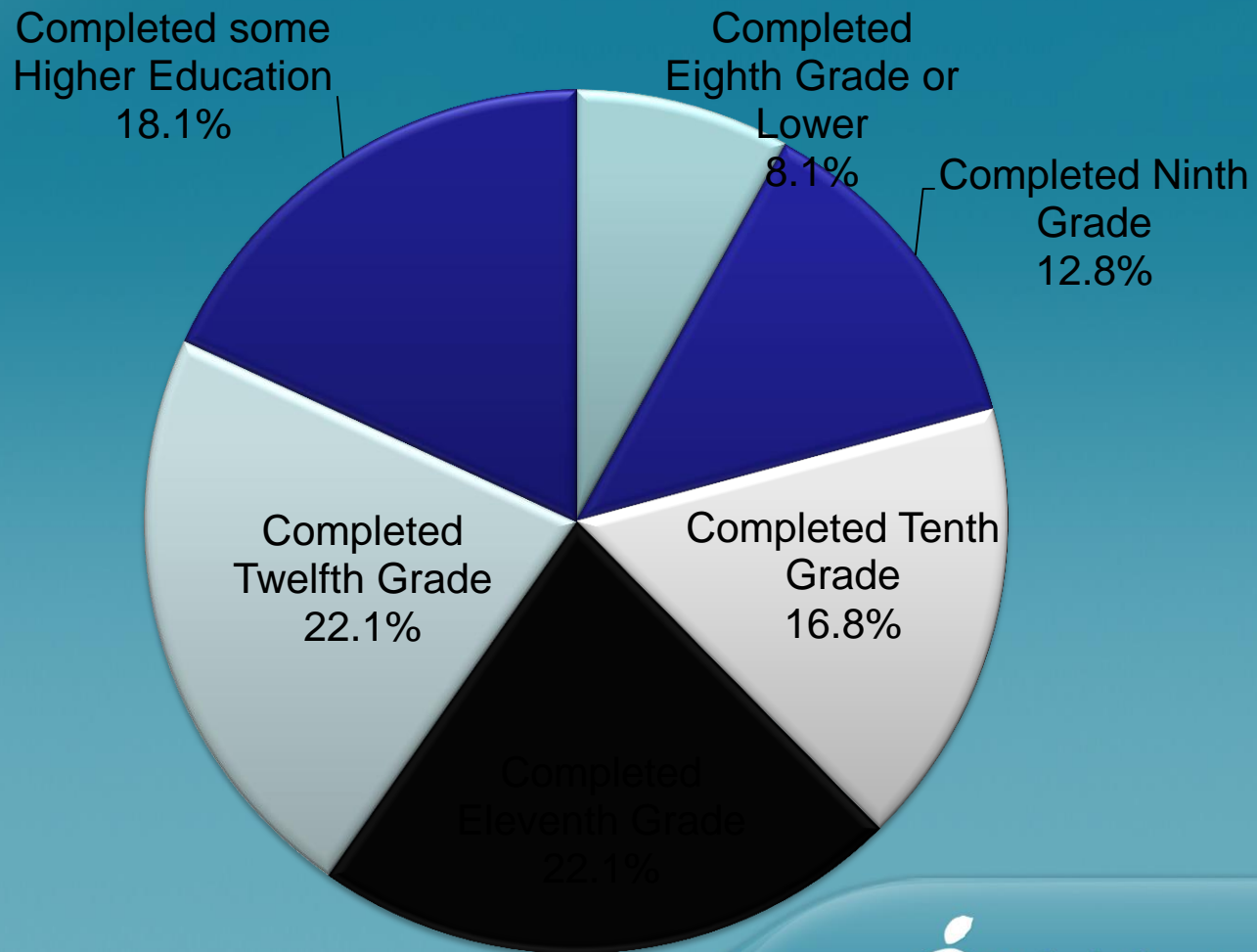
TBI Sample



Participant Level of Education (All Screened)



Participant Level of Education (with possible TBI)



Conclusions to Date

- Ray, Sapp, Kincaid (2014) study demonstrated 35.7% TBI of all levels of severity which is considerably lower
 - Effect of screening performed at intake?
- 11% of those screened show moderate to severe TBI which is lower than CDC data
 - Case manager at PACE was found to have a significantly higher percentage that screened positive for TBI than Parole Officers
 - In October, random sample of 100 offenders will be re-screened to complete a reliability check on initial screening

Conclusions to Date

- No differences in gender, education or race for those with brain injury as compared to overall sample
- Phase 2 started July 2015 where those that screen positive for moderate to severe brain injury will be referred to Indiana VRS for Resource Facilitation services.

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