



Maryland
DEPARTMENT OF HEALTH

Traumatic Brain Injury: Overview for Law Enforcement and Public Safety Professionals

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2020



Case Study #1

- Louisville, KY, 2015:
- <https://www.wlky.com/article/settlement-reached-after-army-veteran-says-metro-police-harassed-wrongfully-detained-him/3572651#>

Performance Objectives

- Learners will understand the cause and incident of brain injury and it's impact on citizens through facilitated discussion
- Learners will familiarize themselves with the physical, behavioral and cognitive (thinking) signs and symptoms common among those living with a history of brain injury through facilitated discussion
- Learners will articulate the connection between a history of brain injury and; mental health disorders, substance abuse and adverse childhood events through lecture, discussion and questions and answers
- Learners will recognize the likelihood of a history of brain injury among people touched by and involved with systems and supports in the areas of homelessness, domestic violence, juvenile justice and behavioral health and law enforcement
- Learners will apply three signs that an individual may have a history of brain injury through observations made of individuals living with a brain injury portrayed in Veteran's and Raleigh Police Department videos
- Learners will deploy 3 strategies to safely engage with and redirect/deescalate individuals living with a history (often hidden) of brain injury through discussion of slide show content and the Veteran's and Raleigh Police Department videos

Introduction

Why is it important for law enforcement professionals to have a working understanding of Traumatic Brain Injury (TBI)?

- A history of TBI is often hidden (**especially if incurred in childhood/adolescence**) among people with cognitive/intellectual disabilities, spinal cord injury, and those with behavioral health challenges (mental health and addiction)
- Recognizing possible signs and symptoms of brain injury in individuals encountered and simple supports to engage with those affected by brain injury can reduce escalation and harm and empower law enforcement to support and when appropriate refer individuals to services

TBI vs. ABI

TBI Defined	ABI Defined
<p>Traumatic Brain Injury (TBI) is an insult to the brain caused by an external physical force, such as a fall, motor vehicle accident, assault, sports-related incident, or improvised explosive device (IED) exposure</p>	<p>Acquired Brain Injury (ABI) is an insult to the brain that has occurred after birth, such as TBI, stroke, near suffocation, infections in the brain, or anoxia and opioid overdose(s)</p>

*Both mechanisms of injury can result in a chronic disability that may get worse with age.

What might it feel like to be living with a brain injury?

Writing and processing exercise



The Basic Brain

What does Traumatic Brain Injury (TBI) look like?

Beyond the Invisible narrated by Lee Woodruff

- <https://youtu.be/ePJqU2LFU-g>

Also found on www.BrainLine.org

The Basic Brain

How many Americans are treated in Emergency Departments (ED), hospitalized, or die as a result of a TBI each year?

- 231,840
- 2.8 million
- 1.2 million

Source: CDC 2017

The Basic Brain

How much does the adult brain weigh?

- 7 pounds
- 3 pounds
- 1.5 pounds

The Basic Brain

At what age, on average, does the adult brain mature?

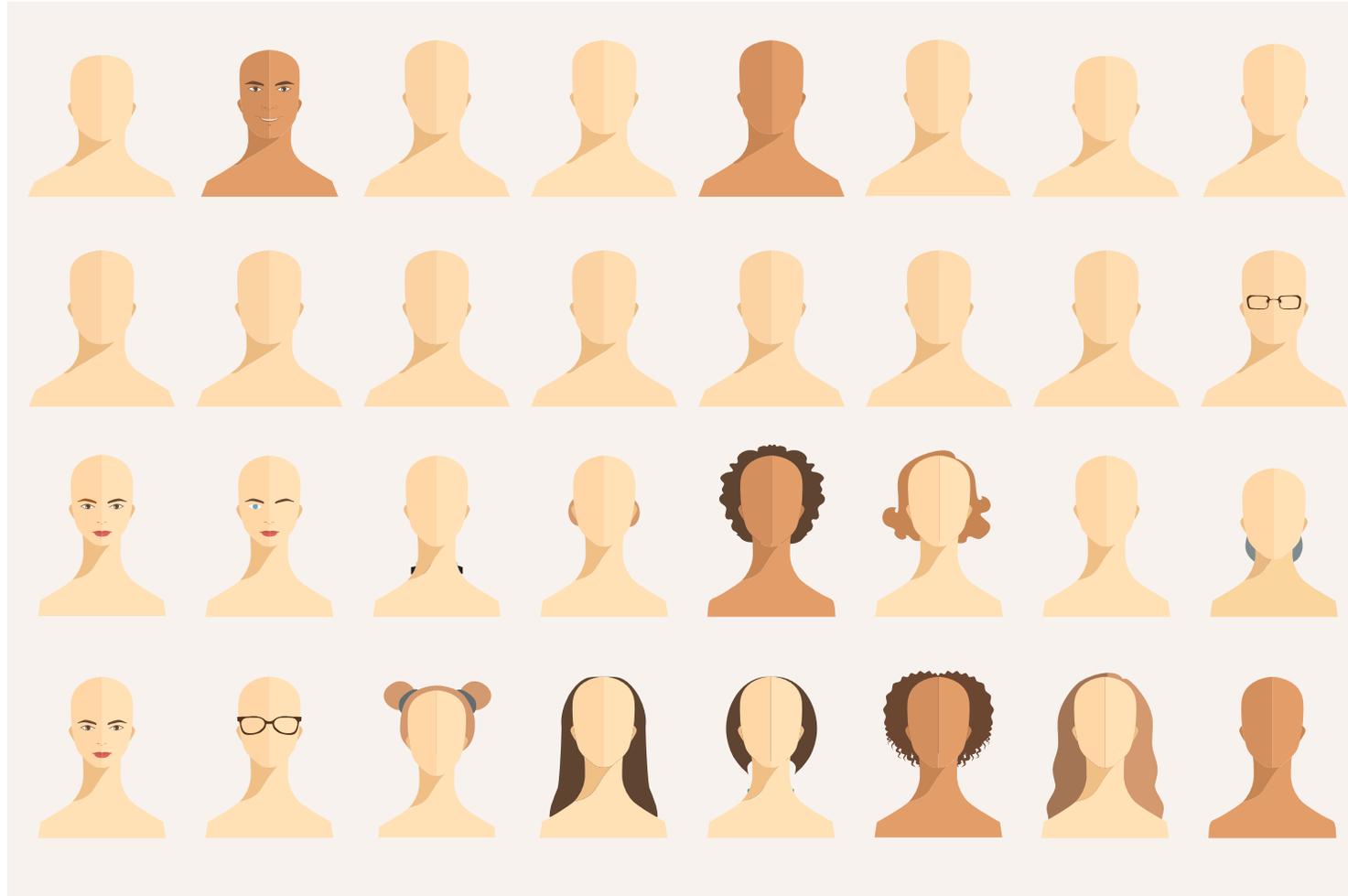
- 18
- 21
- 25

The Basic Brain

What is the last part of the brain to mature?

- Frontal lobe
- Temporal lobe
- Parietal lobe

Bonus question: The frontal lobe develops first in males or females?



Brain Injury Severity

Distribution of severity:

- **Mild injuries = 80 percent**
(Loss of consciousness (LOC) < 30 minutes, post traumatic amnesia (PTA) < 1 hour)
- Moderate = 10–13 percent
(LOC 30 minutes to 24 hours, PTA 1 to 24 hours)
- Severe = 7–10 percent
(LOC >24 hours, PTA >24 hours)

Representative Gabrielle Giffords, Surviving and Thriving after a Severe TBI due to a gunshot wound in January 2011



Show of support following the shooting.



Arriving on stage to speak in 2016.

Risk Factors

Among TBI-related deaths in 2013:

- Rates of TBI were higher for persons 75 years and older—*Why?*
- Falls were the leading cause of death for persons 65 and older
- Intentional self-harm was the leading cause of death for persons 25 to 64—*Why?*
- Motor vehicle crashes were the leading cause of death for persons ages 5 to 24
- Assaults were the leading cause of death for children ages 0 to 4

Source: https://www.cdc.gov/traumaticbraininjury/get_the_facts.html

Risk Factors

Among non-fatal TBI-related injuries in 2013:

- Rates of ED visits highest for those 75 and older and children 0 to 4
- Falls were the leading cause of TBI related ED visits for all but one age group
- Being struck by or against an object was the leading cause of TBI related ED visits for those 15 to 24
- Falls were the leading cause of hospitalization among children 0 to 14 and adults 45 and older
- Motor vehicle crashes were the leading cause of hospitalizations for adolescents and persons 14 to 44 years of age

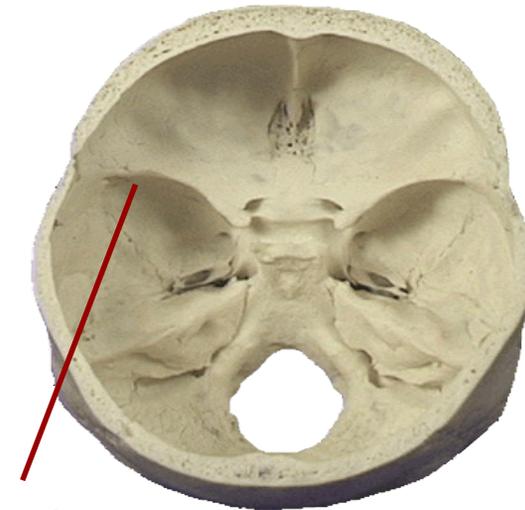
Skull Anatomy

The skull is a rounded layer of bone designed to protect the brain from penetrating injuries.



The base of the skull is rough, with many bony protuberances.

These ridges can result in [injury to the temporal and frontal lobes](#) of the brain during rapid acceleration.



Bony ridges

The Developing Brain

Please keep in mind, TBI is not the only way a young brain can be hurt.

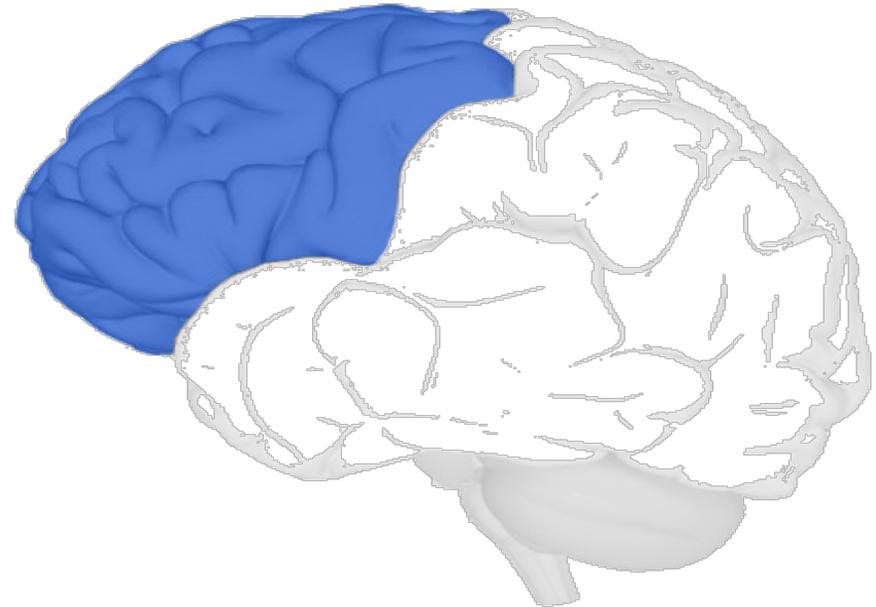
Trauma/abuse and neglect, fetal alcohol poisoning, and exposure to lead paint dust/chips can cause significant developmental and behavioral problems in kids that look perfectly “normal.”

The Frontal Lobe

The **frontal lobe** is the area of the brain responsible for our “executive skills,” or higher cognitive functions.

These include:

- Problem solving
- Spontaneity
- Memory
- Language
- Motivation
- Judgment
- Impulse control
- Social and sexual behavior

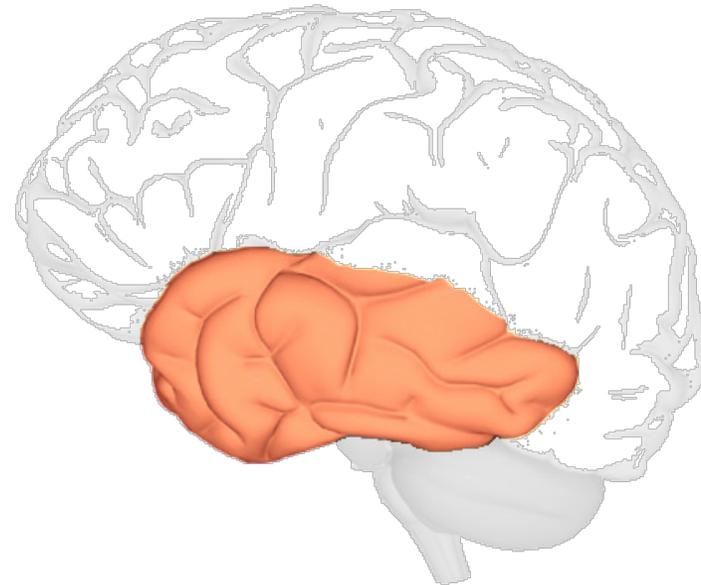


Source: Adapted from Dr. Mary Pepping of the University of Idaho’s presentation “The Human Brain: Anatomy, Functions, and Injury”

The Temporal Lobe

The **temporal lobe** plays a role in emotions and is also responsible for smelling, tasting, perception, memory, understanding music, **aggressiveness, and sexual behavior.**

The temporal lobe also contains the **language area** of the brain.



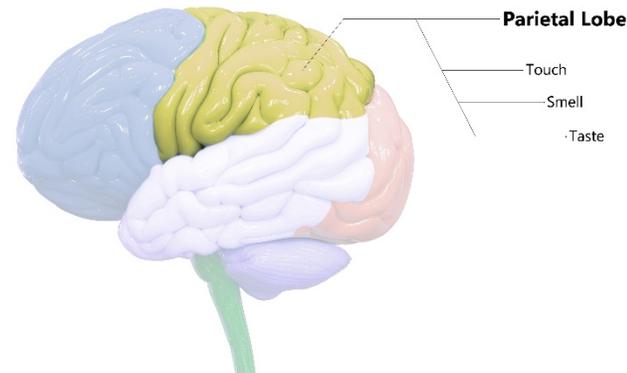
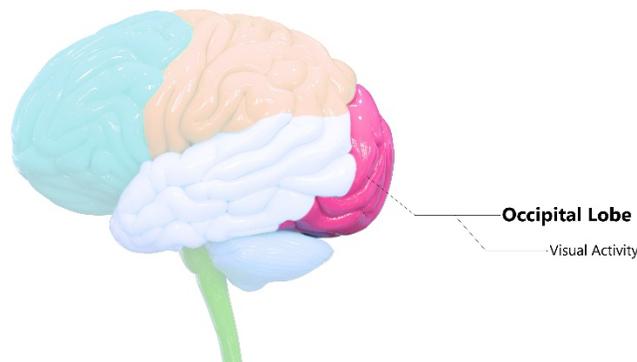
Source: Adapted from Dr. Mary Pepping of the University of Idaho's presentation "The Human Brain: Anatomy, Functions, and Injury"

TBI “Fingerprints”

There are two other lobes in the brain, the occipital and the parietal lobes.

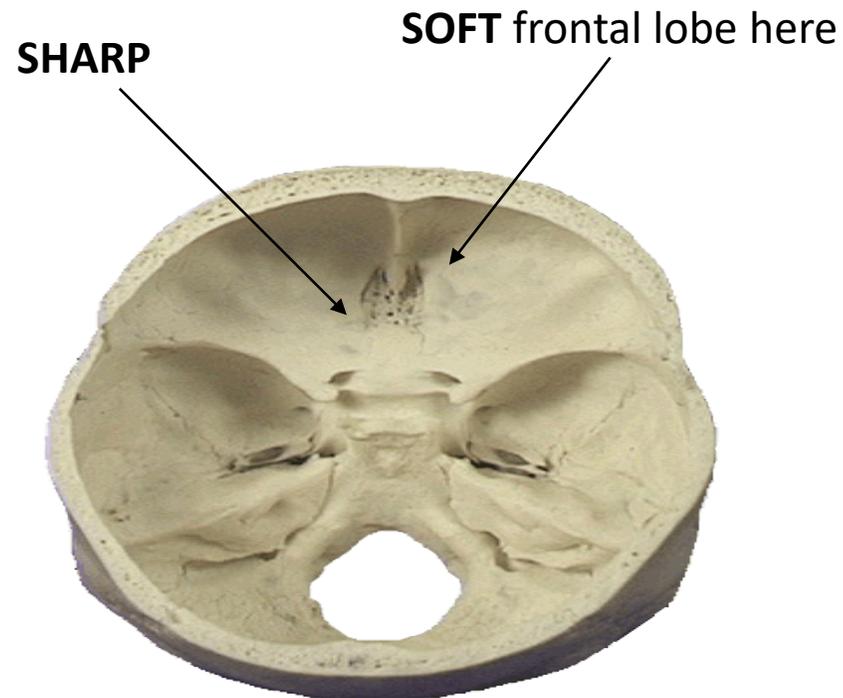
Our frontal lobe and the temporal lobes are key to managing behavior and emotions.

Thus, damage to these regions can contribute to mental health and/or addiction problems. Damage to these lobes is considered the **“Fingerprint of Traumatic Brain Injury.”**

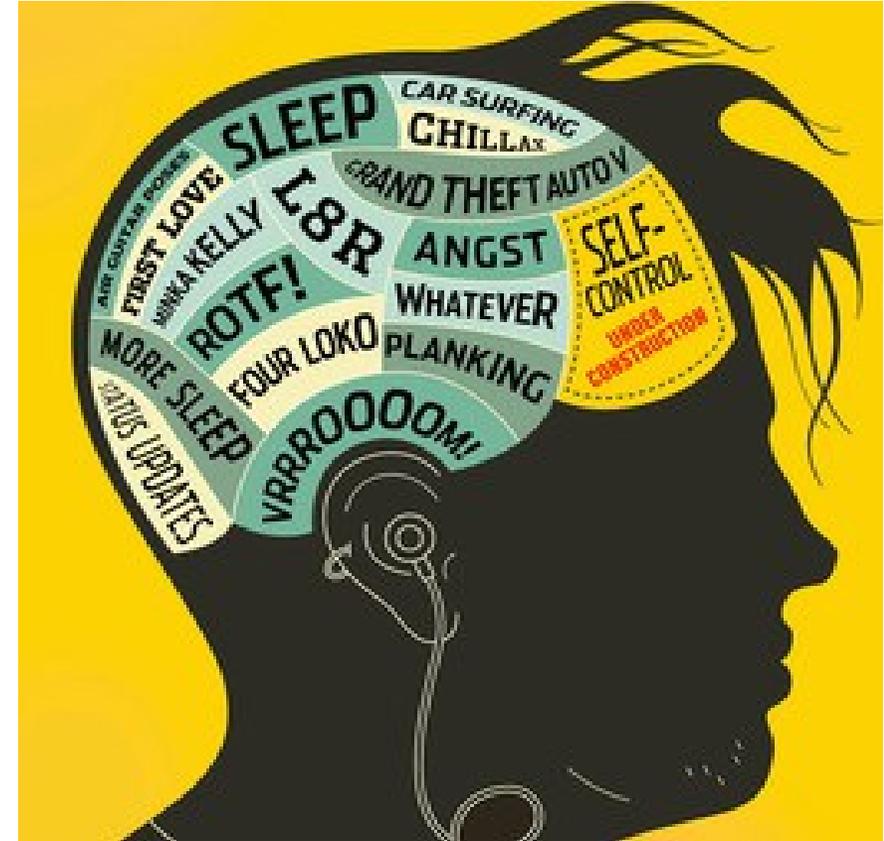
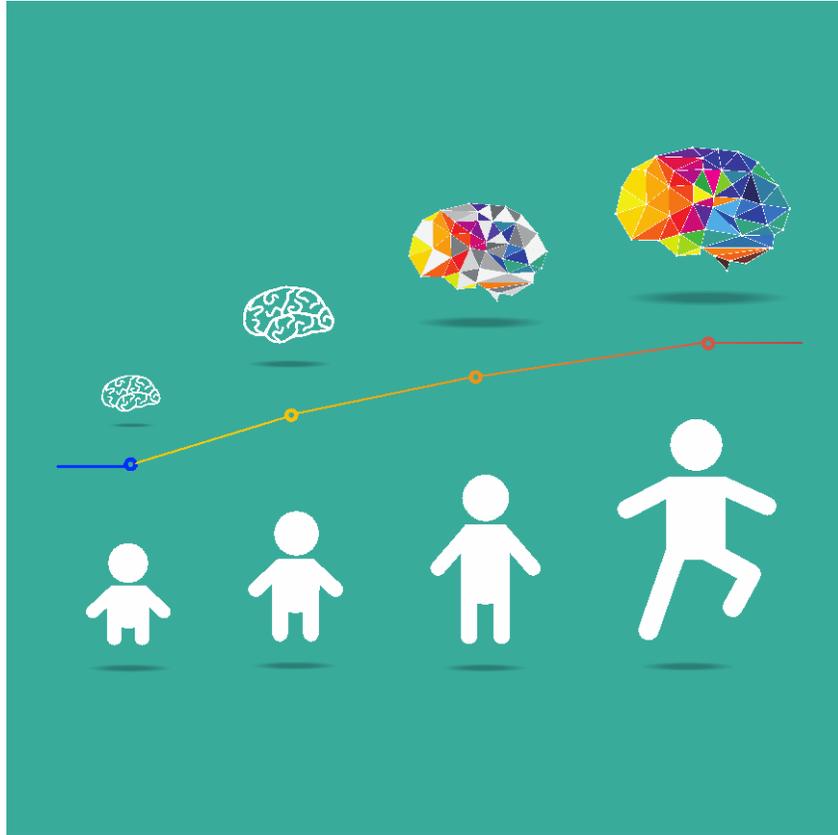


Brain Injury

Many of our adult thinking skills reside in the frontal lobe; the frontal lobe is very vulnerable to injury.



Brain Injury: *Growing* into Brain Injury ...



Brain Injury

Without proper supports, brain injury can lead to mental health and addiction issues that bring people living with “hidden” TBI into the criminal justice system.

- Appropriately, structure offered by school, parents, and community fall away as children go through adolescence into adulthood. A TBI that incurred at age seven may not be fully “unmasked” functionally or behaviorally until age 11, 12, or 13 with the challenges of middle school/puberty
- The frontal lobe and temporal tips injured earlier are unable to adequately respond to the expectations of behavioral regulation and executive skill functioning

Brain Injury

According to a Christchurch, New Zealand study:

- Early childhood TBI, even if mild, may pre-dispose people to later having **behavioral problems and/or involvement with law enforcement**
- People with an early childhood TBI, that resulted in at least one night in hospital, were found to be **three times more** likely as young adults to have alcohol or drug dependency

Brain Injury

In the U.S., researchers are beginning to look at the prevalence of TBI among juvenile offenders:

- A meta-analysis of nine studies published in 2013 found approximately **30 percent** of juvenile offenders have sustained a previous TBI
- In a 2014 article in the *Journal of Adolescent Health*, newly admitted adolescents to the New York City jail system found that **50 percent** of the male juveniles and **49 percent** of the females had a history of TBI

Brain Injury

For law enforcement and criminal justice professionals, **the behavioral impact of damage to the frontal and temporal lobes can be a factor** during interactions with people who otherwise appear “normal.”

Possible Physical Changes

Injury-related problem	How it may affect a person functionally
Coordination	Unsteady gait, poor eye-hand coordination, slow or slurred speech, tremors, paralysis
Visual Deficits	Staring or poor eye contact, blurred or double vision, inability to follow an object with their eyes
Additional Physical Challenges	Seizures, deaf or hard of hearing, fatigue

Possible Cognitive Changes

Injury-related problem	How it may affect a person functionally
Memory	Trouble following directions, providing requested information, making appointments
Processing (receptive)	Understanding what is being said and reading
Processing (expressive)	Trouble putting thoughts into words—tip of the tongue syndrome
Problem solving (related to frontal lobe and temporal tip injury)	Impulsive, easily frustrated, sexually disinhibited, verbally/physically combative, interpersonally inflexible, poorly organized

Possible Behavioral Changes

Injury related problem	How it may affect a person functionally
Depression	Flat affect, lack of initiation, sadness, irritability
Unawareness	Unable to take social cues from others
Confabulation	“Making up stories”
Perservation	Gets “stuck” on a topic of conversation or physical action
Post Traumatic Stress Disorder	Intrusive thoughts, sleep disturbance, hypervigilant
Anxiety	Can exacerbate other cognitive/behavioral problems

Other Clues an individual may have a history of Brain Injury

- Scars on an individual's forehead, neck, face
- The individual is using a cane, walker or wheelchair
- The individual has a limp or appears to drag one foot when walking

Post Traumatic Stress Disorder (PTSD) & Brain Injury: in civilians

- Research suggests that TBI and PTSD co-occur and that TBI is a significant predictor of the development of PTSD
- “PTSD was related to shorter posttraumatic amnesia, memory of the traumatic event, and early posttraumatic symptoms”-in other words, those with mild brain injury with little or no period of unconsciousness maybe more likely to experience posttraumatic symptoms and PTSD

Sources: Hoffman AN, Taylor AN. Stress reactivity after traumatic brain injury: implications for comorbid post-traumatic stress disorder. *Behav Pharmacol.* 2019;30(2 and 3-Spec Issue):115–121. doi:10.1097/FBP.0000000000000461.,
Cnossen MC, Scholten AC, Lingsma HF, et al. Predictors of Major Depression and Posttraumatic Stress Disorder Following Traumatic Brain Injury: A Systematic Review and Meta-Analysis. *J Neuropsychiatry Clin Neurosci.* 2017;29(3):206–224. doi:10.1176/appi.neuropsych.16090165

TBI and PTSD appear to impact parts of the brain critical to behavioral regulation such as:

- Executive skill functioning
- Memory
- Ability to respond to and manage response to fear and stress

Source: Kaplan GB, Vasterling JJ, Vedak PC. Brain-derived neurotrophic factor in traumatic brain injury, post-traumatic stress disorder, and their comorbid conditions: role in pathogenesis and treatment. *Behav Pharmacol.* 2010;21(5-6):427–437. doi:10.1097/FBP.0b013e32833d8bc9

Post Traumatic Stress Disorder (PTSD) and TBI: The Similarities

- Sleep disturbances
- Irritability
- Physical restlessness
- Difficulty concentrating
- Some memory problems

Source: *Invisible Wounds: Serving Service Members and Veterans with PTSD & TBI* National Council on Disabilities
<https://ncd.gov/publications/2009/March042009>

Post Traumatic Stress Disorder (PTSD) and TBI: The Differences

- For individuals with PTSD only-memory for event may be impaired but otherwise memory **AND** the ability to learn is intact
- For individuals with TBI only-older memories are preserved, but have difficulty retaining **NEW** memories and new learning
- Some physical symptoms associated w/TBI: headaches, dizziness, sensitivity to noise, light, vertigo

Source: *Invisible Wounds: Serving Service Members and Veterans with PTSD & TBI* National Council on Disabilities

<https://ncd.gov/publications/2009/March042009>

Recognizing Brain Injury

“Unidentified traumatic brain injury is an unrecognized major source of **social and vocational failure.**”

(To this, we can add educational failure.)

Recognizing Brain Injury

People with TBI are over-represented:

- Among the incarcerated
- Among the homeless
- In addiction services
- In mental health services
- Among those who serve/have served in the Armed Forces*
- Athletes—professional and amateur

*Most service-related TBIs are not combat-related; they occur during training exercises, and during accidents on and off base

Recognizing Brain Injury

Domestic violence:

- People who are victims of domestic violence often have brain injuries from hitting, choking, etc.
- Studies have suggested the perpetrators are also likely to have a history of TBI
- It is difficult for those who have been abused, especially over a long period of time, to organize a plan to leave, due not only to emotional distress and economic considerations, **but also because the parts of their brains responsible for planning, organizing, and remembering have been damaged.** Victims may have impulse control problems themselves. *“She gives as good as she gets”*

Recognizing Brain Injury

People with a history of TBI are at risk of:

- Developing psychosis
- Suicide
- Being unemployed or underemployed

Substance Use Disorders-Alcohol

- “Alcohol intoxication is one of the strongest predictors of Traumatic Brain Injury”
- “A substantial proportion of Traumatic Brain Injury occur in intoxicated individuals”
- Having a history of TBI is a potential risk factor for developing a alcohol use disorder
- Using alcohol after brain injury can negatively impact post brain injury recovery

Source: Weil, Z. M., Corrigan, J. D., & Karelina, K. (2018). Alcohol Use Disorder and Traumatic Brain Injury. *Alcohol research : current reviews*, 39(2), 171–180.

Alcohol Intoxication (AI), TBI & overlapping signs

Signs of AI only

Staggering or unsteady walking
Odor of alcohol
Eyes are red
Overly friendly, giggly

Overlapping signs

Slurred speech
Sudden mood change
Poor balance
Nystagmus (rapid, involuntary movement of eyes)
Slow to answer questions
Anger outbursts when provoked
Poor memory
Miscalculating depth or distance
Poorly coordinated movements

Signs of TBI Only

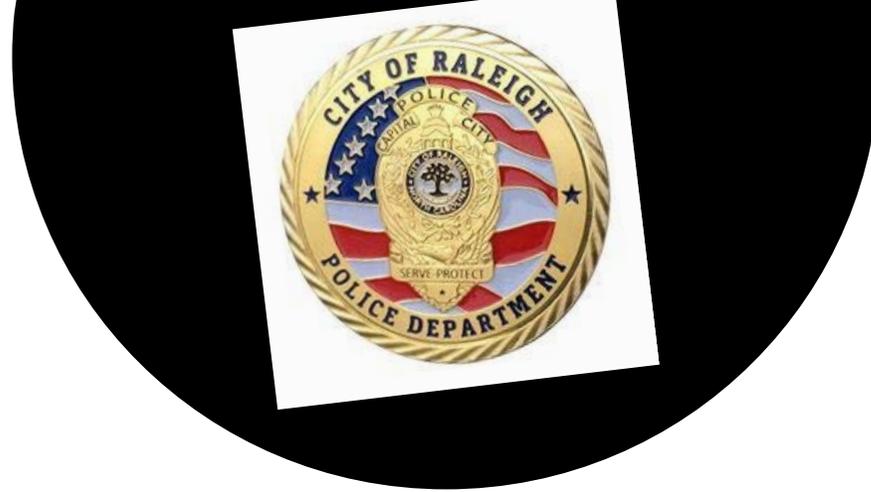
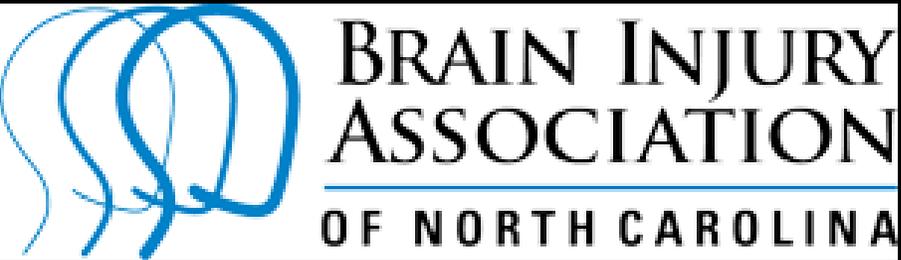
Uneven but consistent walking
Scars on head
Irritable
Distractible
Weak, breathy voice

Substance Abuse Disorders-Opioids

Updating the “fingerprint” of Brain Injury—hypoxic-ischemic damage from a lack of oxygen to the brain:

- Overdosing on opiates suppresses or stops breathing, denying oxygen to the brain
- NO oxygen to the brain = anoxic brain damage
- REDUCED oxygen to the brain = hypoxic brain damage
- Cell death begins in the brain after only five to six minutes of oxygen deprivation
- overdoses in which a person survives likely cause hypoxic and anoxic brain damage
- The impact of executive functions—particularly self-regulation—is very similar to the impact of **TBI**

Now that we understand a bit about how brain injury can impact individuals, how can law enforcement best engage with those who are encountered in the community who may be in crisis.



Brain Injury Association of North Carolina and The Raleigh Police Department's Training Video

[Video](#)

Simple Engagement/De-Escalation Strategies for Officers

- Make and maintain eye contact during interactions
- Speak in short, simple sentences
- Speak in a neutral tone
- Ask the person to paraphrase what you have said frequently
- Give the person time to process what is being said
- When possible, give the person a “heads up” regarding what to expect during your interaction

Simple De-Escalation Strategies

- Behavior-specific praising: Reinforce the positive behaviors you see—
“I like how you are sitting here talking to me”
- Redirection
- Choose your battles. . . only focus on what matters
- Non-verbal cues (including tone of voice) **will be interpreted first**

Source: Joelle Ridgeway, MS

Simple De-Escalation Strategies

Positive prompting—don't give attention to negative behavior and don't sound authoritative:

- Person becoming distracted—*“We are almost finished here, thank you for sitting here talking to me”*
- Person is yelling at you or someone else—*“Lower your voice please”*
- Person hitting fists on car/wall—*“Let's walk over here”*

Source: Joelle Ridgeway, MS

Simple De-Escalation Strategies

Positive prompting—don't give attention to negative behavior and don't sound authoritative (*continued*):

- Person has something in their hands that they could hurt themselves with—*“Please put the bat over here”*
- Person grabs your arm—*“Please keep your hands to yourself”*

NOTICE how **concrete and specific** these examples are

Source: Joelle Ridgeway, MS

Resources

- **Brain Injury Association of Maryland:** www.biamd.org, 410-402-8478

Offers Maryland citizens information about brain injury and where to find help and treatment

- **Brainline:** www.brainline.org

Funded through the Defense and Veterans Brain Injury Center, Brainline offers civilians and returning service members with Brain Injury, families, and professionals a variety of information and resources regarding life after Brain Injury

Thank you

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