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## What Substance Use Disorder Professionals Should Know About TBI



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- National Institute on Disability Independent Living and Rehabilitation Research (NIDILRR)
- National Institutes of Health (NIH)
- Patient Centered Outcomes Research Institute (PCORI)
- Administration on Community Living (ACL) State TBI Partnership Program

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## 4 Questions

1. How is brain injury associated with risky use of substances?
2. Why would brain injury be associated with risky use substances?
3. How does brain injury affect substance use disorder treatment?
4. What can be done to accommodate the effect on treatment?

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## 1. How is brain injury associated with risky use of substances?

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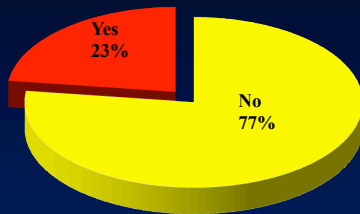
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### Pre-Injury Risky Alcohol Use Among US Adults in Rehab for TBI



Drinking in excess of age and gender guidelines for healthy use at the period in their life when the injury occurred.

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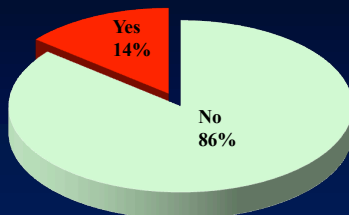
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### Risky Alcohol Use Among US Adults Alive 5 Years after Rehab for TBI



Drinking in excess of age and gender guidelines for healthy use when interviewed 5 years after injury.

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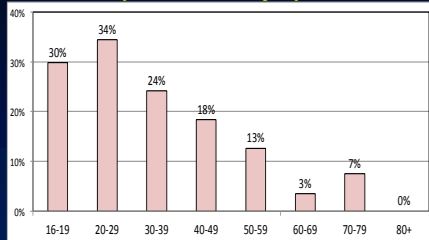
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### 14.2% engaged in risky alcohol use in the 5 years since injury

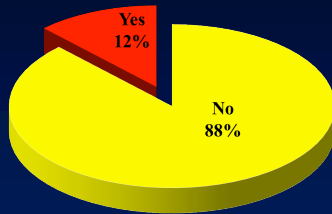


Of the average annual 13,700 admissions to U.S. IRF's\* with a primary diagnosis of TBI, an estimated annual average of more than 1,945 have engaged in risky alcohol use in the 5 years after injury.

\*October 1, 2001 and December 31, 2007

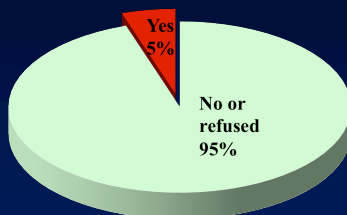
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### Illegal Drug Use in Year before Injury

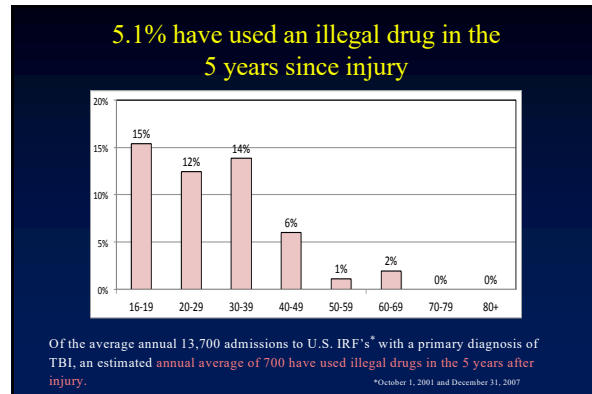


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### Illegal Drug Use Among US Adults Alive 5 Years after Rehab for TBI



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**Negative Effects of Risky Alcohol Use After Rehabilitation for TBI**

- Is associated with unemployment, criminal activity, depression, seizure, suicide, and other causes of premature mortality (see Corrigan et al., 2021)
- Interactive effect for indicators of brain function and structure (e.g., Dikmen et al., 1993; Bigler et al., 1996; Baguley et al., 1997; Barker et al., 1999)

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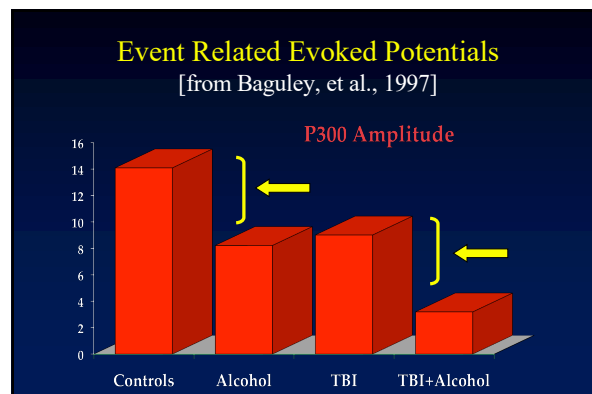
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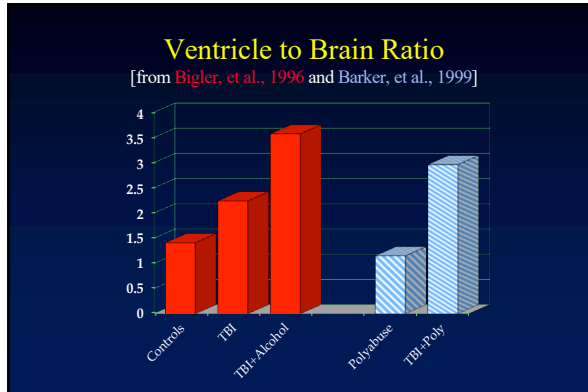
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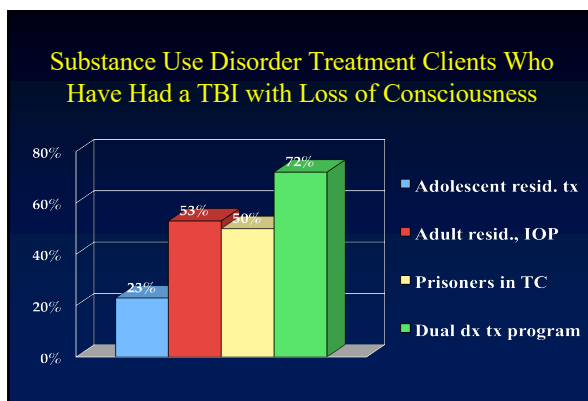
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### Cannabis Use and TBI

- Cannabis use and TBI **rarely studied**—13 studies in last 12 years, only 9 empirical (Corrigan, Adams & Dams-O'Connor, 2021)
- Population surveys from Ontario Canada (before legalization): TBI more than **doubled association** with cannabis use, in both adolescents and adults (Ilie et al., 2015, 2019)
- Birth cohort from UK: prior TBI a risk factor for cannabis use at age 17 relative to controls without injuries, but not more so than orthopedic injury controls (Kennedy, Cohen & Munafo, 2017)
- Similar finding from large survey of university students—once prior delinquency and risk-taking accounted for, prior TBI was not a risk factor for cannabis use (Kort-Butler, 2017)

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## Reasons for Cannabis Use after TBI

Hawley et al., 2018

- Acute rehabilitation patients many years after injury
- 45% using cannabis (legal for recreational use in state)
- Reasons for use: recreational (72%), stress/anxiety reduction (62%), improving sleep (55%).

Lawrence et al., 2020

- Prospective cohort in a concussion clinic
- 14% used cannabis sometime during the first 4 weeks post-injury
- No association with either more or faster recovery
- Among those not recovered after 1 month, cannabis use was associated with lower number and severity of symptoms

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## A "Cascade of Vulnerability" to Opioid Addiction



Persons with TBI more likely prescribed opioids

- Headache and orthopedic pain common with TBI
- Persons with persistent post-concussive syndrome more likely prescribed opioids
- 70% of patients receiving rehabilitation for TBI prescribed opioids

Persons with TBI more susceptible to addictive influence of opioids

Persons with TBI have more challenges for successful treatment

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## 2. Why would brain injury be associated with risky use of substances?

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## 2. Why would brain injury be associated with risky use of substances?

- Intoxication causes TBIs
- Early life TBIs predispose to substance misuse

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## Natural History of TBI to Age 25 from the Christchurch Birth Cohort (McKinlay et al., 2008)

By age 25:

- Those hospitalized with 1st TBI before age 6,  
3 times more likely to have a diagnosis of either alcohol or drug dependence
- Those hospitalized with 1st TBI 16-21,  
3 times more likely to be diagnosed with drug dependence
- TBI highly associated with likelihood of arrest

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## Age at Injury Among Persons Receiving Substance Use Disorder Treatment Services Corrigan, Bogner & Holloman (2012)

- More serious injuries or younger age at 1st injury associated with slower speed of information processing and greater cognitive complaints.
- Addictions more severe for those 1st injured before age 11.
- Uniqueness of early childhood TBI observed for persons with substance use disorders replicated in a sample of prisoners.

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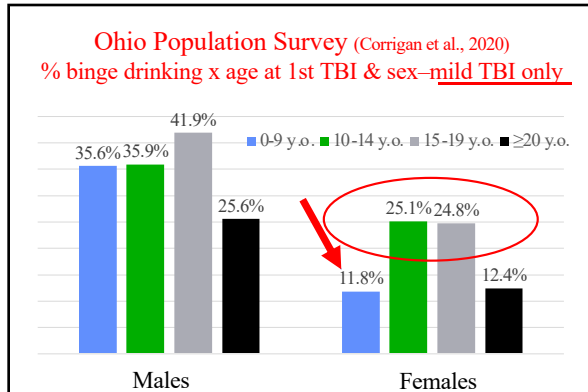
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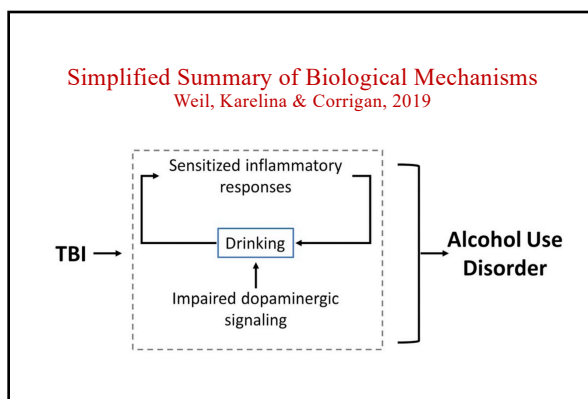
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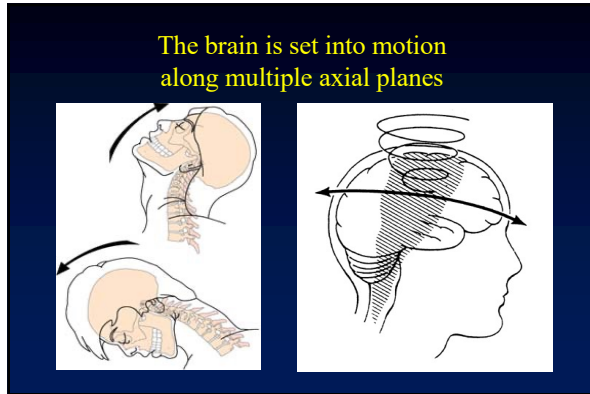
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## 2. Why would TBI be associated with substance use disorders?

- Intoxication causes TBIs
- Early life TBIs predispose to substance misuse
- Structural damage from TBI changes behavioral control

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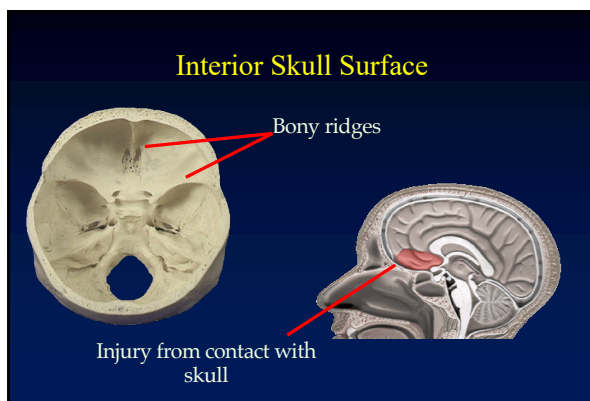
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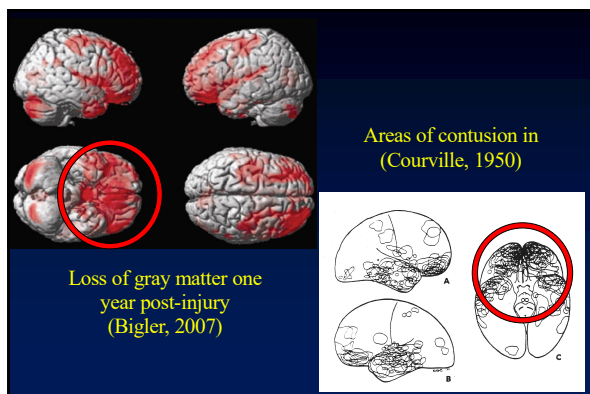
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## The “Fingerprint” of TBI

Frontal areas of the brain, including the frontal lobes, are the most likely to be injured as a result of TBI, regardless the point of impact to the head

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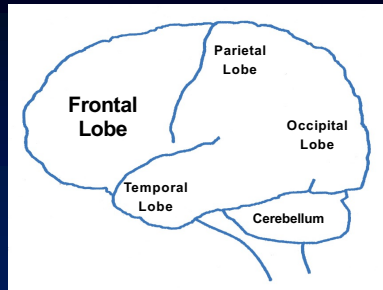
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## Simplified Brain Behavior Relationships

### Frontal Lobes

- Initiation
- Problem solving
- Judgment
- Inhibition of impulse
- Planning/anticipation
- Self-monitoring
- Motor planning
- Personality/emotions
- Awareness of self
- Organization
- Concentration
- Mental flexibility
- Speaking



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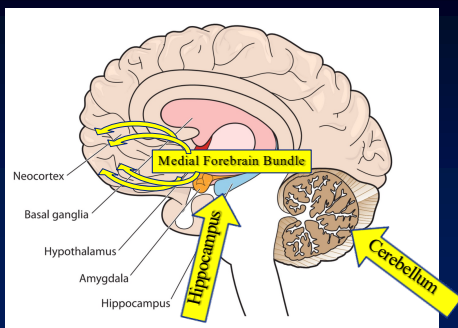
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## Anoxic/Hypoxic Brain Damage



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### 3. How does brain injury affect substance use disorder treatment?

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### 3. How does TBI affect substance use disorder treatment?

- TBI is common among people in substance use disorder treatment
- There are unique challenges for this client population
- There are unique clinical considerations for treatment planning

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### Two Consistent Clinical Observations:

- Compared to others in SUD treatment there is an even *greater* disconnect between TBI clients' intentions and their behavior.
- Clients with TBI are more likely to prematurely discontinue treatment, often after being characterized as non-compliant.

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### Reasons for negative effect on outcome due to TBI:

- Neurobehavioral consequences undermine ability to participate “conventionally” in treatment

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### People with TBI face additional challenges seeking substance abuse treatment

It's easy to see behavior as intentionally disruptive, particularly when there are no visible signs of disability:

- Frontal lobe damage affects regulation of thoughts, feelings & behavior—promoting disinhibition.
- Social “rules” may not be observed and interpersonal cues not perceived, creating consternation for fellow clients and staff.

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### People with TBI face additional challenges ...(cont'd)

Cognitive impairments may affect a person's communication or learning style, making participation in didactic training and group interventions more difficult.

Misinterpretation of neurological problems as resistance to treatment undermines treatment relationships.

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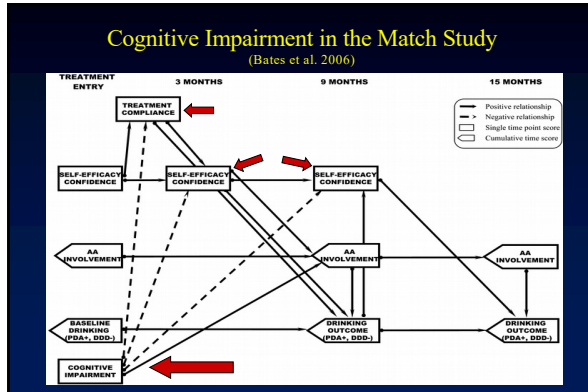
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**Reasons for negative effect on outcome due to TBI:**

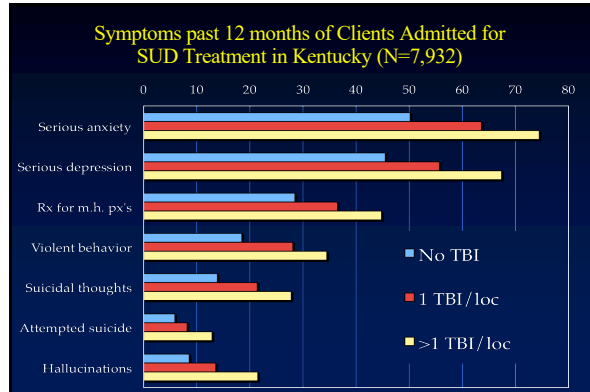
- Neurobehavioral consequences undermine ability to participate “conventionally” in treatment
- Greater co-occurring psychiatric disorders for those with TBI

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**27 substance use disorder treatment facilities in New York**  
(Sacks et al. 2009)

	No History of TBI	History of TBI
Age at first use	16.9 yo	15.2 yo
> 2 prior SUD treatments	41.7%	50.4%
Current mental illness	17.5%	29.4%
Hospitalized for mental illness	11.4%	19.6%

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Dually diagnosed SUD and Severe Mental Illness [N=295]  
(McHugo et al., 2016)

- 80% at least 1 TBI; 61% at least 1 TBI with LOC; 24% at least 1 mod/sev TBI
- Extent of TBI history associated with worse alcohol use, **worse psychiatric symptomology**, more arrests, greater homelessness
- TBI history associated with greater likelihood of **PTSD** and **anti-social and borderline personality disorders**.
- Earlier age at 1<sup>st</sup> TBI with LOC associated with presence of psychotic spectrum disorders

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Reasons for negative effect on outcome due to TBI:

- Neurobehavioral consequences undermine ability to participate “conventionally” in treatment
- Greater co-occurring psychiatric disorders for those with TBI
- Less ability to sustain improvements without external structure

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### TBI among participants in IDDT (Corrigan & Deutschle, 2008)

- SAMHSA funded Targeted Capacity Expansion grant
- Collaborative program in 2 rural counties
- 51 program participants (50 included in analyses)
- in active treatment in one of the collaborating agencies
- previous diagnoses of both a psychiatric and substance use disorder

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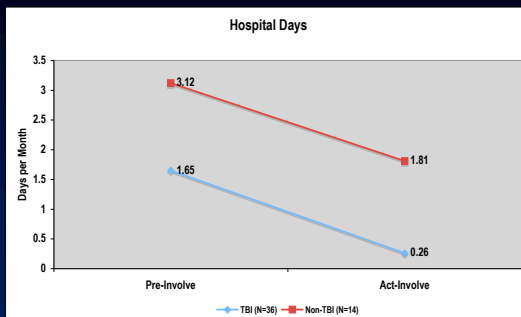
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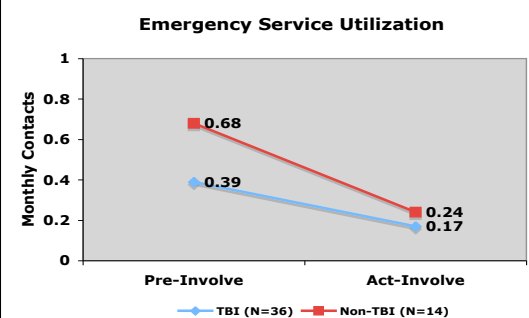
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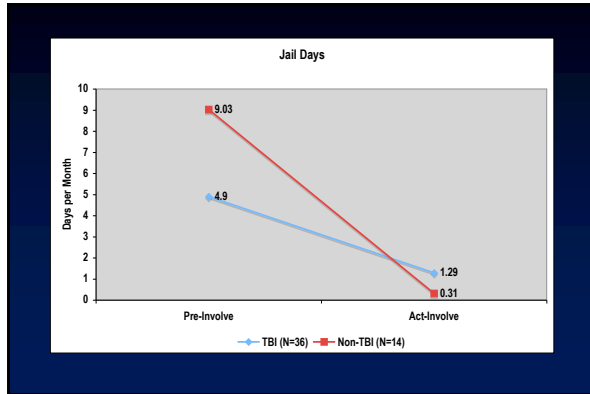
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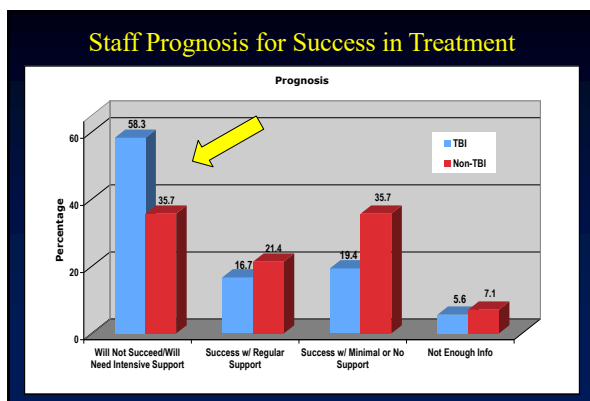
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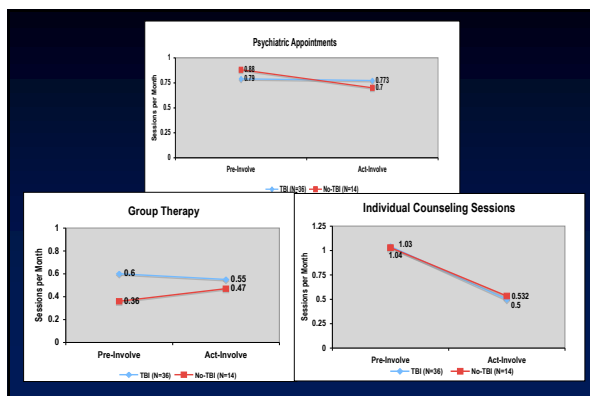
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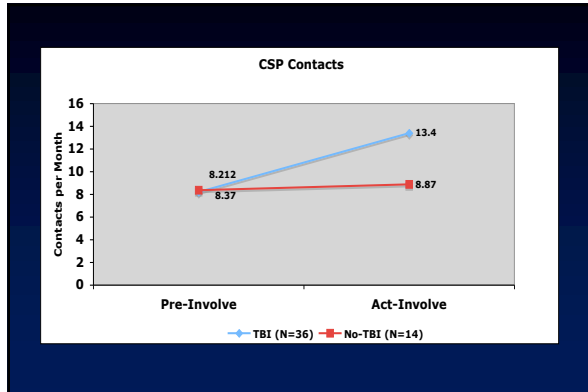
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4. What can be done to  
accommodate the  
effect on treatment?

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Every SUD treatment provider should  
know whether the person they are  
working with has had a TBI.

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### Selected Methods of Eliciting Self-report

- DVBIC Brief TBI Screen (BTBIS; Schwab et al.)
- TBI Questionnaire (TBIQ; Diamond et al.)
- Brain Injury Screening Questionnaire (BISQ; Gordon et al.)
- OSU TBI Identification Method (OSU TBI-ID; Corrigan & Bogner)
- Boston Assessment of Traumatic Brain Injury Lifetime (BAT-L; Fortier et al.)

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### Recommendations for SUD Treatment Providers

SUD treatment planning needs to incorporate:

- Accommodations for neurobehavioral deficits
- Co-morbid interactions (e.g., depression, anxiety, pain)
- Formal and/or informal supports needed during and after treatment completion

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### Problematic History of TBI

Due to cognitive and/or behavioral weaknesses that result from damage to the frontal areas of the brain, persons with a problematic history of TBI may have difficulty:

- knowing what problems they have;
- changing their behavior;
- accessing services; and/or
- remaining engaged in services.

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## Accommodating the Symptoms of TBI

Presented by:

**Ohio Valley Center for Brain Injury Prevention and Rehabilitation**

With contributions from Minnesota Department of Human Services State Operated Services

Developed in part with support of a grant from the US Department of Health and Human Services, Health Resources and Services Administration (HRSA) to Ohio Rehabilitation Services Commission and The Ohio State University

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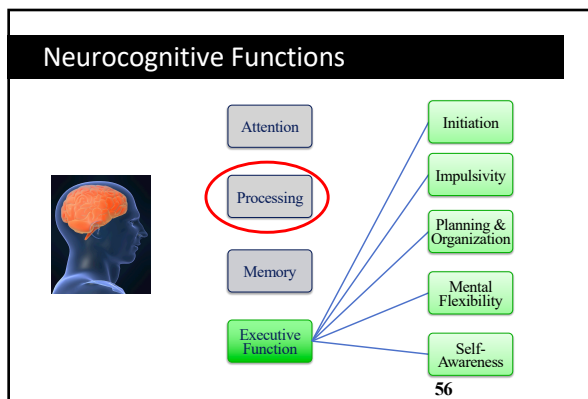
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**Problem = Processing**

*The time it takes to think through and understand new information or concepts can be affected when a person has had a TBI. This does not mean they cannot understand – they may just need more time to understand.*

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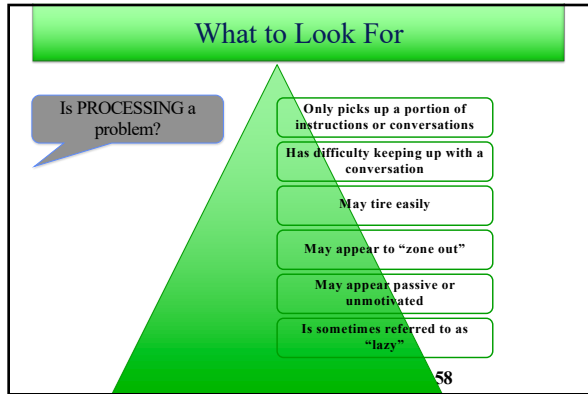
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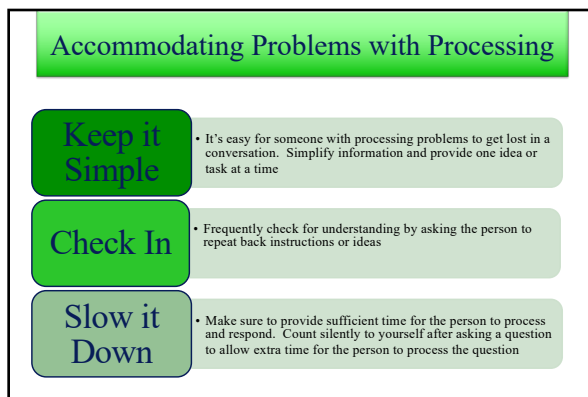
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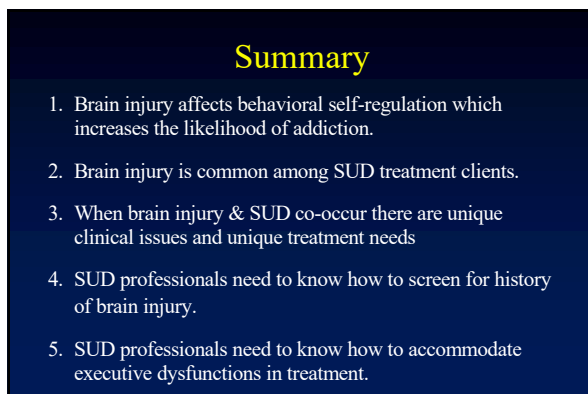
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### A brain healthy lifestyle!

- Avoid any more TBIs
- Eat well
- Exercise regularly
- Get at least 7 hours sleep
- Don't drink alcohol or use illicit drugs
- Stop smoking
- Be engaged with people & projects
- Seek to minimize the stress in your life
- Seek to increase restfulness with relaxation training, meditation or other practices

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## THANK YOU

### Further Resources

[www.SUBI.ca](http://www.SUBI.ca)  
[www.OhioValley.org](http://www.OhioValley.org)  
[www.BrainLine.org](http://www.BrainLine.org)

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