Traumatic Brain Injury and Homelessness

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Learning Objectives

1. To recognize the possible causal connections between traumatic brain injury (TBI) and homelessness.
2. To understand the high prevalence of TBI among homeless adults and the potential value of screening for history of TBI.
3. To consider the roles that TBI prevention and post-TBI rehabilitation may play in the prevention of homelessness.

Traumatic Brain Injury

- A major public health problem
- A leading cause of permanent disability
- 1.4 million Americans suffer head injuries annually
- 18,000 Canadians admitted to hospital with brain injury each year

Traumatic Brain Injury and Homelessness - Connections

- Victims of physical abuse during childhood have increased risk of homelessness as adult – physical abuse may result in TBI
- Substance abuse increases risk of homelessness, and also increases risk of TBI
- Homeless people have high rates of unintentional injuries (a leading cause of death)
- Homelessness exposes individuals to unsafe environments and assault

Traumatic Brain Injury and Homelessness - Connections

- Providing care for homeless individuals is sometimes difficult due to problematic behaviors
- Severe or repeated TBI can cause cognitive impairment, attention deficits, disinhibition, impulsivity, emotional lability
- In people who are homeless, are we seeing some of the long-term consequences of TBI?
- Is TBI a causal factor on the pathway to homelessness?

Traumatic Brain Injury and Homelessness - Connections

- Clinicians have occasionally remarked on the large number of homeless patients with history of TBI
- No studies in peer-reviewed literature have examined TBI in a large representative sample of homeless people

Study Objectives

1. To determine lifetime prevalence of TBI in a representative sample of homeless people
2. To identify temporal relationships between TBI and the onset of homelessness
3. To characterize the association between history of TBI and current health problems

Methods

Sampling

- Community-based representative sample of 1,200 homeless persons in Toronto, Canada
  - 29,000 shelter users per year
  - 5,000 homeless individuals on any given night
- Homelessness defined as living in a shelter, public place, vehicle, abandoned building, or someone else's place within the last 7 days, and not having a place of one's own
- Homeless families (n=300) excluded from all analyses

Recruitment Sites

- Recruitment at 50 shelters and 18 meal programs over 12 month period
- 10% of sample recruited at meal programs
- Meal program users were eligible if
  - Homeless within the last 7 days AND
  - No shelter use within the last 7 days
- Stratification by sex, M:F = 2:1

Eligibility

- 1,679 individuals screened for eligibility
- 13% did not meet study definition of homelessness
- 3% meal program users who were homeless but had recently used a shelter
- 4% unable to communicate in English
- 3% unable to give informed consent
- 6% no Ontario health insurance number
- Total exclusions: 29% of those screened

Eligibility

- 1,190 individuals screened and eligible
- 24% declined to participate
- 0.3% data on TBI missing
- TBI data available for 904 individuals (76% of eligible individuals approached)
- Payment for participation: $15

Survey

- Demographic characteristics
- Health conditions
- Physical and mental health status (SF-12)
- Mental health, alcohol, and drug problems in the past month (Addiction Severity Index) – present/absent

History of TBI

- Ascertained using questions from a study of TBI in prison inmates
- “Have you ever had an injury to the head which knocked you out or at least left you dazed, confused, or disoriented?”
- Number of head injuries
- Date (or Age) of head injuries
- Whether unconscious after head injury
- Duration of unconsciousness

History of TBI

- Mild TBI: no loss of consciousness, or unconsciousness ≤ 30 minutes
- Moderate/Severe TBI: unconsciousness > 30 minutes
- Criteria from Head Injury Interdisciplinary Special Interest Group of the American Congress of Rehabilitation Medicine

History of TBI

- Age at which the participant first experienced homelessness was determined at a separate point much earlier in the survey interview
- This information was used to determine the temporal relationship between first TBI and first episode of homelessness

Results

Demographics

- Mean Age: 37.4 years
- Male 67%, Female 34% (by stratification)
- Race: White 61%
  Black 18%
  First Nations 10%
  Other race 11%
- Place of birth: Canada 73%
  Outside Canada 27%

Demographics

- Education: Less than high school 53%
  High school or equiv. 21%
  College or above 27%
- Mean age at first episode of homelessness: 28.5 yrs
- Mean lifetime duration of homelessness: 4.4 yrs

Demographics

% Born in Canada, by Race:

White:	89%
First Nations:	98%
Black:	31%
Other races:	35%

TBI History

Lifetime prevalence of TBI:

53% overall

58% among men

42% among women

TBI vs. no TBI

	TBI	No TBI
	n=475	n=429
Mean Age (years)	37.6	37.1

TBI vs. no TBI

	TBI	No TBI
Sex		
Male	73%	59%
Female	27%	41%

TBI vs. no TBI

	TBI	No TBI
Race		
White	68%	52%
Black	10%	27%
First Nations	10%	11%
Other Race	10%	12%

TBI vs. no TBI

	TBI	No TBI
Place of Birth		
Canada	82%	64%
Outside Canada	18%	36%

TBI vs. no TBI

	TBI	No TBI
Age at first episode of homelessness	27.5	29.6
Lifetime years of homelessness	4.9	3.8

TBI vs. no TBI

	TBI	No TBI
Seizures (ever)	22%	8%
Mental health problems	43%	33%
Alcohol problems	42%	28%
Drug problems	57%	40%

TBI vs. no TBI

	TBI	No TBI
SF-12 Mental subscale	39.0	43.8
SF-12 Physical subscale	43.9	48.1

TBI History

n = 475

Severity of worst TBI

Mild	66%
Moderate/severe	23%
Unknown	11%

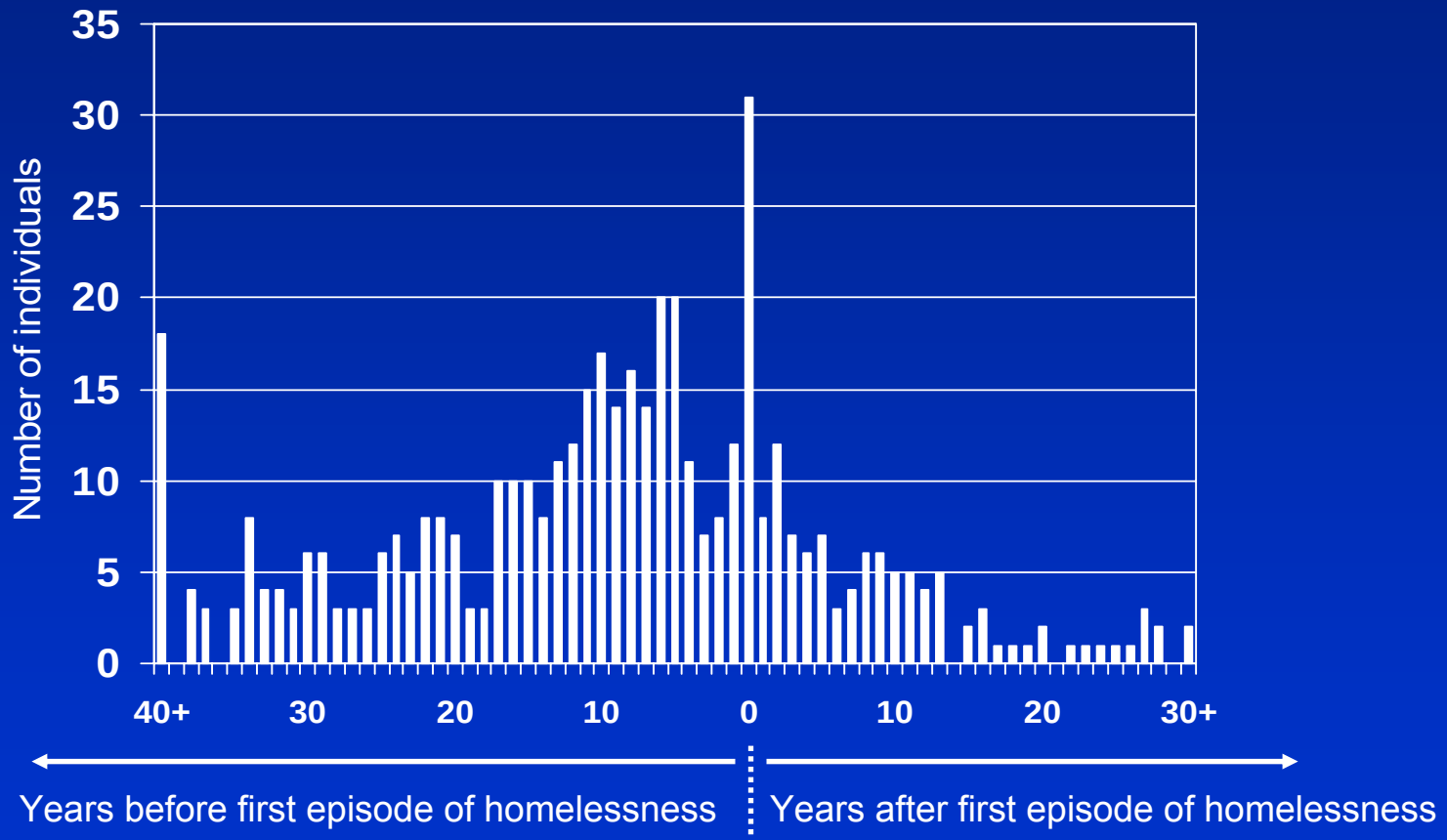
TBI History

Number of TBIs in lifetime	
1	40%
2	21%
3	12%
4	7%
5 or more	20%

TBI History

Mean Age at first TBI: 17.8 years

Time of first TBI relative to first episode of homelessness



Association of TBI with health problems

- No TBI vs. Mild TBI vs. Mod/severe TBI
- Health problems: seizures, mental health problems, alcohol problems, drug problems, SF-12 mental health and physical health scores
- Logistic or linear regression
- Multivariate models adjusted for sex, age, race, place of birth, education, and lifetime duration of homelessness

Association of TBI with health problems

Seizures	OR (95% CI)
No TBI	1.0
Mild TBI	2.57 (1.66, 3.99)
Mod/Severe TBI	3.13 (1.77, 5.55)

Model adjusted for sex, age, race, place of birth, education, and lifetime duration of homelessness

Association of TBI with health problems

Mental Health Problems	OR (95% CI)
No TBI	1.0
Mild TBI	1.34 (0.98, 1.83)
Mod/Severe TBI	2.48 (1.57, 3.90)

Model adjusted for sex, age, race, place of birth, education, and lifetime duration of homelessness

Association of TBI with health problems

Alcohol Problems	OR (95% CI)
No TBI	1.0
Mild TBI	1.45 (1.06, 1.99)
Mod/Severe TBI	1.66 (1.05, 2.63)

Model adjusted for sex, age, race, place of birth, education, and lifetime duration of homelessness

Association of TBI with health problems

Drug Problems	OR (95% CI)
No TBI	1.0
Mild TBI	1.72 (1.26, 2.34)
Mod/Severe TBI	1.66 (1.04, 2.65)

Model adjusted for sex, age, race, place of birth, education, and lifetime duration of homelessness

Association of TBI with health problems

SF-12 Mental function	Difference (SE)
No TBI	0
Mild TBI	-4.52 (0.94)
Mod/Severe TBI	-8.13 (1.39)

Model adjusted for sex, age, race, place of birth, education, and lifetime duration of homelessness

Association of TBI with health problems

SF-12 Physical function	Difference (SE)
No TBI	0
Mild TBI	-3.93 (0.77)
Mod/Severe TBI	-5.90 (1.15)

Model adjusted for sex, age, race, place of birth, education, and lifetime duration of homelessness

Key Observations - 1

- Lifetime prevalence of TBI in a representative sample of homeless people is more than 5 times greater than in the U.S. general population
- TBI prevalence among homeless people is within the range reported among jail and prison inmates

Key Observations - 2

- In Toronto, prevalence of TBI is lower among homeless people who are black than homeless people who are white
- Surprising in light of data on TBI in the U.S. general population
- “Healthy immigrant” effect?

Key Observations - 3

- First TBI usually antedated first episode of homelessness
- Is TBI a causal factor contributing to the onset of homelessness?
- Need data from case-control or cohort studies

Key Observations - 4

- History of TBI strongly associated with wide array of adverse health outcomes
- Cross-sectional study – unable to ascertain causal pathways responsible for observed associations
- Cognitive sequelae of TBI may increase the risk of subsequent mental health, alcohol, and drug problems
- However, pre-existing mental health, alcohol, and drug problems may increase the risk of experiencing TBI
- Need data from a prospective longitudinal study of individuals with recent TBI to clarify relationship

Strengths

- First study to examine prevalence of TBI in large, representative sample of homeless individuals in a major North American city
- Included both shelter users and non-shelter users
- High response rate (76%)
- History of TBI assessed using a series of previously validated questions

Limitations

- History of TBI based on self reports, subject to recall bias
- Self-reports not confirmed through review of health records
- Information not collected on the mechanism or circumstances of TBI
- Participants did not undergo formal testing to assess for neuro-psychological dysfunction

Implications for Service Providers

- Clinicians should routinely screen homeless patients for history of TBI
- TBI should be considered a possible cause of neuro-psychological dysfunction and behavioral problems
- Further efforts should be directed at the management of TBI-related problems such as impulsive behavior, and the treatment of co-occurring alcohol or substance abuse

Implications for Service Providers

- Persons with brain injuries may have attention deficits, making it difficult for them to focus on tasks and understand, remember, or respond to directions
- These individuals may need more time to follow instructions; slowness should not be misinterpreted as a lack of effort or cooperation
- TBI-related brain dysfunction can predispose to irritability or impulsivity that should be understood in the context of the person's previous injury

Implications for Housing Programs

- Provision of permanent supportive housing is essential to end homelessness among individuals with significant neuro-psychological impairments due to TBI

Implications for Prevention

- Prevention of TBI may play a role in the prevention of homelessness
  - ? Child abuse
  - ? Risky behaviors during adolescence
- Access to post-TBI rehabilitation may play in the prevention of homelessness
  - ? Especially in disadvantaged/uninsured populations

Research Team

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