

Traumatic brain injury and homelessness: from prevalence to prevention



Traumatic brain injury (TBI) is a major public health issue. Each year, 50–60 million people will experience their first TBI and it is estimated that half of the global population will experience at least one TBI during their lifetime.¹ TBI disproportionately affects young people and is a leading cause of death among children and adolescents in high-income countries.¹ Despite increased education and prevention efforts, the global burden of TBI is increasing.² Emerging evidence suggests that the risk factors for TBI closely align with the social determinants of health and causes of social exclusion, including poverty and marginalisation. Although good evidence shows that socially excluded groups, including people who are homeless, are more likely to die from injury than the general population,³ our understanding of TBI in these groups is poor.

In *The Lancet Public Health*, Jacob Stubbs and colleagues⁴ evaluate the lifetime prevalence of TBI among people who are homeless or marginally housed. By doing a meta-analysis of 22 studies identified through a systematic review, they generated a pooled estimate of lifetime TBI prevalence in this population of 53.1% (95% CI 46.4–59.7) for any TBI severity and 22.5% (95% CI 13.5–35.0) for moderate to severe TBI. This lifetime prevalence of TBI of any severity is between 2.5-times and 4.0-times higher than estimates for the general population. Of note, the estimated lifetime prevalence of moderate to severe TBI is almost ten-times higher than in the general population. These findings are strong evidence that homeless and marginally housed individuals experience a disproportionate burden of TBI and are a key group for efforts aimed at better identification and treatment.

The identification of TBI among homeless or marginally housed people is likely to be particularly challenging because of a high prevalence of severe mental illness, harmful substance use, and profound multimorbidity among this group, and probable diagnostic overshadowing. Accordingly, Stubbs and colleagues recommend increased screening for TBI among homeless or marginally housed individuals in clinical settings and a lower threshold for referral for more accurate, yet costly, neuroimaging diagnostic methods. In a meta-regression, the authors found that

the method used to identify TBI significantly affected the estimated prevalence, suggesting that structured interviews are needed to identify those who require further diagnostic testing to ensure equitable access to treatment.

Advances in the use of biomarkers could improve the efficiency and accuracy of TBI identification, help guide its subsequent management, and decrease the cost of doing so.⁵ These improvements could be especially important among children and adolescents who might not be able to communicate their symptoms effectively.⁶ However, identification and referral to specialist services might not be sufficient to achieve equivalent outcomes among such highly marginalised populations with complex health and social needs. The transient nature of homelessness complicates the ability of clinical services to provide long-term follow-up care and rehabilitation. Therefore, contact with the health system for TBI is a critical opportunity to identify and provide social and housing support to people who are at risk of housing instability.

We must acknowledge that even for those who receive evidence-based treatment and rehabilitation, TBI can still result in poor health, functional, and socioeconomic outcomes that can endure over their lifespan.⁷ Therefore, prevention must be a central component of public health efforts to reduce the incidence and overall burden of TBI. However, we have a poor understanding of effective injury prevention strategies in marginalised groups and further research is warranted in this field. Among the studies that reported age of first TBI, Stubbs and colleagues calculated a weighted mean age of first TBI of 15.8 years (range 15.0–19.9) and younger age at first homelessness was consistently associated with a history of TBI among the included studies. These findings suggest that providing individuals, particularly young people, with stable housing is important for preventing TBI.

It is becoming increasingly clear that TBI can be both a cause and consequence of homelessness.⁸ The functional and socioeconomic consequences associated with TBI can present challenges to finding and retaining stable housing.⁸ Conversely, a dose-dependent relationship exists between the duration of homelessness and the occurrence of TBI (ie, the longer a person is homeless, the

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See [Articles](#) page e19

higher the risk of TBI).⁹ Given the increasing evidence for a potential causal relationship, a randomised controlled trial investigating the effect of a housing intervention on TBI incidence is both feasible and warranted. The Housing First model, in which homeless people are provided immediate access to permanent, non-contingent housing, has been found to reduce hospital contact for injury.¹⁰ Establishing the effectiveness of a Housing First approach in preventing TBI among people at risk of housing instability should be a public health priority for researchers and policy makers.

To ameliorate the substantial TBI burden experienced by homeless and marginally housed people, we must combine efforts to identify and treat TBI with integrated case-management and prevention strategies that address both the housing needs and determinants of social exclusion for those at risk of housing instability.

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- 1 Maas AIR, Menon DK, Adelson PD, et al. Traumatic brain injury: integrated approaches to improve prevention, clinical care, and research. *Lancet Neurol* 2017; **16**: 987–1048.
- 2 GBD 2016 Neurology Collaborators. Global, regional, and national burden of neurological disorders, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016. *Lancet Neurol* 2019; **18**: 459–80.
- 3 Aldridge RW, Story A, Hwang SW, et al. Morbidity and mortality in homeless individuals, prisoners, sex workers, and individuals with substance use disorders in high-income countries: a systematic review and meta-analysis. *Lancet* 2018; **391**: 241–50.
- 4 Stubbs JL, Thornton AE, Sevvick JM, et al. Traumatic brain injury in homeless and marginally housed individuals: a systematic review and meta-analysis. *Lancet Public Health* 2019; published online Dec 2. [https://doi.org/10.1016/S2468-2667\(19\)30188-4](https://doi.org/10.1016/S2468-2667(19)30188-4).
- 5 Yue JK, Yuh EL, Korley FK, et al. Association between plasma GFAP concentrations and MRI abnormalities in patients with CT-negative traumatic brain injury in the TRACK-TBI cohort: a prospective multicentre study. *Lancet Neurol* 2019; **18**: 953–61.
- 6 Stukas S, Higgins V, Frndova H, et al. Characterisation of serum total tau following paediatric traumatic brain injury: a case-control study. *Lancet Child Adolesc Health* 2019; **3**: 558–67.
- 7 Steyerberg EW, Wiegers E, Sewalt C, et al. Case-mix, care pathways, and outcomes in patients with traumatic brain injury in CENTER-TBI: a European prospective, multicentre, longitudinal, cohort study. *Lancet Neurol* 2019; **18**: 923–34.
- 8 Binder AS, Lancaster K, Lengenfelder J, Chiaravalloti ND, Genova HM. Community integration in traumatic brain injury: the contributing factor of affect recognition deficits. *J Int Neuropsychol Soc* 2019; **25**: 890–95.
- 9 Mackelprang JL, Harpin SB, Grubenhoff JA, Rivara FP. Adverse outcomes among homeless adolescents and young adults who report a history of traumatic brain injury. *Am J Public Health* 2014; **104**: 1986–92.
- 10 Mackelprang JL, Collins SE, Clifasefi SL. Housing First is associated with reduced use of emergency medical services. *Prehosp Emerg Care* 2014; **18**: 476–82.