Are Individuals Recovering From Mild Traumatic Brain Injury Vulnerant Drivers?

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Last year, 1,611 people were killed in road traffic crashes in Australia, and crashes cost the Australian economy $17 billion each year. This presentation will propose a rationale for the study of drivers’ hazard perception after mild traumatic brain injury (MTBI, commonly known as concussion).

Mild traumatic brain injury
MTBI is defined as a closed head injury associated with an initial Glasgow Coma Scale score of 13 to 15. However, the labelling of the least severe class of traumatic brain injury as ‘mild’ belies the various physical, emotional and cognitive symptoms, and protracted recovery, that many individuals with MTBI experience. Hospital figures suggest an annual incidence rate of at least 100 to 300 MTBs per 100,000 people. When non-hospitalized cases are also considered, the true incidence rate of MTBI may be much higher.

Relevance of MTBI to road safety
MTBI is a priority for road safety research due to its high incidence, coupled with the detrimental post-MTBI symptoms and the increased likelihood that people with MTBI will soon return to driving (as opposed to those with more severe brain injuries). Despite this, driving performance has never been investigated in an MTBI sample, even though moderate and severe traumatic brain injury have been shown to adversely affect driving. Severe traumatic brain injury has been associated with crash risk; individuals who returned to driving after severe traumatic brain injury were 2.3 times more likely to be involved in a crash in one study.

Drivers’ hazard perception
Drivers’ hazard perception is the ability to detect potentially dangerous traffic situations (i.e. upcoming traffic that may require the driver to take evasive action). It is an important construct for road safety researchers, as several studies suggest that slower hazard perception is associated with higher crash rates. As a result of its relationship with crash involvement, hazard perception has also become an important skill for driving licensing authorities to assess. To date, several Australian states and the United Kingdom have added hazard perception to their driver licensing programs. In hazard perception tests, drivers view videos of traffic scenes filmed from the driver’s perspective and are required to register a response as soon as they detect a potential hazard in a scene (i.e. response latency is the dependent measure).

MTBI could impair hazard perception
Given that individuals with MTBI show impairment on cognitive functions such as attention, information processing speed, memory and executive functioning for up to 3 months post-injury, their hazard perception could also be compromised in the days after injury. If individuals with MTBI do have slower hazard perception in the days after injury, then it follows that they could be at increased risk of crashing if they drive during recovery. Therefore, hazard perception should be investigated in an MTBI sample.

Current Studies
- Emergency Department: Patients with MTBI and orthopaedic-injured controls are being recruited from an emergency department within 24 hours of injury. Hospital-treated MTBI within 24 hours of injury can be thought to represent the most severe end of the MTBI continuum (i.e. if hazard perception is impaired after MTBI at all, it should be impaired in such a sample).
- Brain Injury Outpatients: Traumatic brain injury outpatients (about 3 months post-injury) and uninjured controls will be recruited from a brain injury rehabilitation unit. It is predicted that a severity effect will be found, i.e. participants with moderate to severe traumatic brain injury will perform worse on hazard perception than participants with MTBI and uninjured controls.
- Sports Concussion: Rugby players are participating in a control time series design, with preseason and post-MTBI hazard perception testing. Athletes may not seek medical attention for concussions, therefore establishing the effect of sports MTBI (separate to hospital-treated MTBI) on hazard perception is important, both for road safety and for the clinical management of concussed athletes.
- Previous Head Injury: Undergraduates and members of the general community are participating in correlational research. Their history of previous head injury could be related to their current hazard perception.

References