

*Note on 12/10/17: We wrote a letter to Joerg Heber, Editor of the journal PLOS ONE, commenting on the article by McInnes et al (2017). However, as a matter of general policy, the Editor does not review and publish letters in their journal. Therefore, we have published this version at <http://www.vaneuropsychiatry.org/brief-summary-of-comments-to-mcinnnes-paper/>.*

To: Joerg Heber

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Editor

PLOS ONE

Dear Dr. Heber,

Based on their scoping review of the literature, McInnes et al (McInnes, Friesen et al. 2017) made the interesting observation that 55% of individuals with a single mild traumatic brain injury (TBI) have chronic cognitive impairment. This proportion was much higher than the often-quoted 15% rate reported in older studies (Rutherford, Merrett et al. 1979, Sterr, Herron et al. 2006 , Spinos, Sakellaropoulos et al. 2010).

The authors discussed several limitations of their study, but they did not comment on the sources from which the TBI patients were selected. Since selection of samples can have important effects on the results of a study, we examined data regarding sample source that was available on 40/45 (88.9%) of the studies they reported. Of these 40 studies, the categorical distribution of sample sources (number of studies, and percentages of total) were as follows: Emergency department (ED) (35/40 = 87.5%); TBI outpatient clinic (2/40 = 5%); recruited TBI patients via advertisement (2/40 = 5%);

and soccer players with a history of concussion ( $1/40 = 2.5\%$ ). Thus, the large majority of studies were based on patients selected from ED settings.

Since the large majority of the patients were drawn from ED settings, the authors' conclusions should be limited to patients who present to the ED after an injury. Probably this reflects a subset of patients with mild TBI who have a more severe form of mild TBI. For example, a mild sports concussion is a mild TBI that typically resolves fully in hours to days. Most athletes with mild concussions do not go to the ED and would not be represented in the McInnes review. In contrast, a high velocity motor vehicle accident can cause a more severe and persistent form of mild TBI because of greater forces to the brain; furthermore, these patients often have other bodily injuries such as lacerations or fractures that increase the likelihood that the patient would go to an ED. These were the main types of patients represented by the McInnes article.

Consistent with these ideas, a recent well-designed study of mild TBI patients who presented to the ED found that, one year after injury, 59% had persistent postconcussive syndrome (PCS), which includes cognitive impairment (Waljas, Iverson et al. 2015). Although postconcussive symptoms are notoriously nonspecific, the rate of postconcussive syndrome was higher in mTBI patients than in normal controls. Furthermore, several studies have found that the risk of PCS at 1 year was increased for patients who had symptoms at 1 month compared to those who did not have PCS at 1 month.

Taken together, these findings suggest that the incidence of persistent cognitive symptoms after mild TBI probably is higher than the often-referenced 15% figure, but probably not as high as the 55% figure reported by the McInnes et al. However, for the

important subset of patients who present to the ED, and perhaps for other patients who suffer relatively large forces to the head (for example, those which can occur in motor vehicle accidents), the incidence indeed may be 55%. Many of these patients will have persistent cognitive and other neuropsychiatric symptoms at one month after injury, in which case, they are at significantly increased risk of having chronic persistent symptoms.

Respectfully,

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