MEMORY PERFORMANCE AS A FUNCTION OF ANXIETY IN INDIVIDUALS WITH AND WITHOUT MILD HEAD INJURY

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Background
Much research focuses on moderate to severe traumatic brain injury and little research has examined the cognitive sequelae and emotional regulation, particularly anxiety, following mild head injury (MHI) which can be much less subtle and involve alterations in consciousness without extensive neural loss. Typically it has been suggested that post-concussive symptoms subside after a three month period and functioning is assumed to return to previous abilities. Yet, some individuals may have persistent psychological, behavioural, socioemotional, occupation and cognitive difficulties.

Furthermore, individuals with neurological compromise may be particularly vulnerable to stress and anxiety and may experience differential arousal that may affect performance abilities. Are there potential interacting effects of stress/anxiety for enjoyment of academics and life satisfaction in persons who have sustained a MHI?

Do limitations in memory performance persist in individuals with MHI, for which organic damage is less easily verified, and is in fact subtle (i.e. found in high functioning individuals such as university students), as compared to individuals without MHI as a function of anxiety?

Method
Participants
University students (N = 50); 30% reported history of MHI

Measures and Procedure
Standardized neuropsychological tests, questionnaires, and a structured interview were administered, including:
- Narrative memory - immediate and delayed (Wechsler Memory Scale—Third Edition)
- Visuospatial memory - immediate and delayed (Rey Complex Figure test)
- Indices of anxiety - state and trait (State-Trait Anxiety Inventory)

Results
State anxiety levels differed between individuals with and without MHI, F (1, 48) = 4.23, p = .045, such that individuals with MHI reported significantly lower levels of anxiety than individuals without MHI.

Those with high state anxiety were also high in trait anxiety, F (1, 48) = 10.187, p = .003.

Time required for completion of the delayed reproduction (after a minimum 30 minute delay) of the RCF varied significantly between MHI and no MHI groups as a function of state anxiety, F (1, 48) = 4.47, p = .040, and varied marginally for time for completion of immediate reproduction of RCF, F (1, 48) = 2.935, p = .09.

Discussion and Conclusions
Overall, individuals who reported higher anxiety, state or trait, reported lowered enjoyment of academics and overall life satisfaction, especially those who experienced a MHI during their teenage years. Given the prevalence of sports-related injuries and risk-taking activities during one’s teens, and the subtlety of the injuries in this study, this can have dramatic implications for the well-being and adjustment of students in university.

Further, academic performance is compromised as a function of anxiety (i.e. Yerkes-Dodson curve) and MHI for both verbal and spatial material, as measured by memory ability. Consistent with earlier findings, heightened anxiety/arousal impairments performance, but only for individuals without MHI. Individuals with MHI reported an underaroused state (i.e. lower anxiety) overall compared to individuals without MHI. With lower anxiety states they performed less well than their cohorts, and yet were more satisfied with school and life. In contrast, individuals with MHI performed better with relatively heightened anxiety and arousal (awareness), albeit less satisfied overall.

Therefore, increased arousal advantages performance and processing speed on memory tasks for individuals with a history of MHI, however negatively impacts their enjoyment of school and life.

These findings indicate the potential limitations of underaroused that has found to be associated with orbitofrontal disruption and may be implicated in MHI generally. Further, the neurological and emotional sequelae following MHI may not be transient despite both the subtle nature of the head trauma and the competency of the individuals involved (e.g. university students). The results demonstrate that sustaining a MHI is predictive of long-term deficits in cognitive functioning, specifically memory performance which is differentially influenced by arousal/anxiety. Further, higher perceived anxiety has a negative impact on enjoyment of university education, as well as overall life enjoyment, particularly for those with a more recent MHI.

References