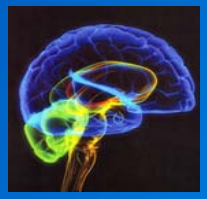

Mild Head Injury in University Students: Personality Differences, Moral Decision Making and Arousal

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Introduction

◆Affecting an estimated 10 million people per year, worldwide makes Traumatic Brain Injury (TBI) a pressing public health and medical concern[1]. While much of the literature has focussed on the wide range of physical, cognitive, behavioural and affective deficits[2,3] following moderate-severe TBI, there is a paucity of literature on the potential ramifications of milder forms of injury (almost 90 per cent of all head injuries)[4].

◆ Due to the acceleration/deceleration forces generated during impact trauma, the Ventromedial Prefrontal (VMPF) region of the brain is particularly susceptible to damage due to its proximal relation to the orbital protrusions of the skull[5].

◆Injury to the frontal lobe, more specifically the VMPF region , has been associated with poor decision making in which brain-injured individuals are unable to anticipate the future consequences of their actions and therefore more likely to take riskier decisions which may lead to disadvantageous outcomes[6].

◆Various personality changes such as general dampening of emotional experience, poorly modulated emotional reactions, lack of empathy, socially inappropriate behavior, and lack of insight have also been reported in individuals with damage to this region[7]. These behavioral tendencies closely comply with the diagnostic criteria for sociopathy, but since they appear post injury, the term "acquired sociopathy "is used.

◆Such sociopathic tendencies are especially seen in social decisions around morality. Previous studies have found that individuals with damage to the VMPF region are more likely to endorse personal moral transgressions and take less time in doing so relative to controls[8,9].

◆It has been proposed that "somatic markers" or "gut" feelings influences decision making in complex/uncertain situations[6]. This physiological input is disrupted with damage to the VMPF region rendering the individual physiologically underaroused, such that due to lack of physiological (visceral) feedback, individuals make "un-informed" decisions

◆The current study attempts to mirror these findings, in particular, the socio-emotional ramifications of head trauma, in a competent university sample reporting a history of mild head injury (or altered state of consciousness) challenging the dichotomy between brain and head injury.

Purpose

To examine the construct of "Acquired Sociopathy" (personality differences) and its relation to moral decision making and arousal in a sample of competent university students reporting a history of Mild Head Injury.

Hypotheses

Relative to their no MHI cohorts, we expect:

1. **Individuals with a history of MHI to score higher on components of secondary psychopathy (erratic lifestyle and anti-social behaviour);**
2. **Individuals with a history of MHI to endorse greater direct-physical moral transgressions;**
3. **The MHI group to report themselves as equally capable problem solvers in social situations as the no MHI group;**
4. **The MHI group to be physiologically under-aroused, even as severity of transgression outcome increases from indirect non-moral to direct physical harm.**

Method

PARTICIPANTS

Fifty Brock University students (32 females, 18 males), with 20% (n = 10) reporting a history of mild head injury, participated in this study.

MEASURES AND PROCEDURE

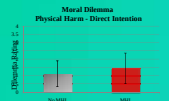
- **Moral Decision Making Task[10]:** which varied as a function of *intentionality* (Direct versus Indirect) and *type of transgression outcome* (Non-moral, Non-physical and Physical)
- **Physiological:** pulse rate, electrodermal activity [EDA], and respiration[11], Self report ratings of stress.
- **Questionnaires:** Self-report Psychopathy Checklist (SRP III)[12] with four subscales of psychopathy including – Primary (Callous Affect and Interpersonal Manipulation) and Secondary (Erratic Life-style, Anti-social Behavior) psychopathy; and Social Problem Solving Inventory (SPSI-R)[13].

Results

HYPOTHESIS 1

University students with a history of MHI relative to their no MHI cohort, scored higher on Erratic Lifestyle and Anti-social Behaviour (Secondary Psychopathy), as well as Callous Affect (Primary Psychopathy), F (1,48) = 4.17, p < .05.

HYPOTHESIS 2

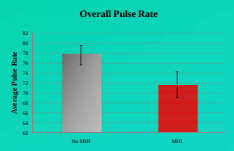


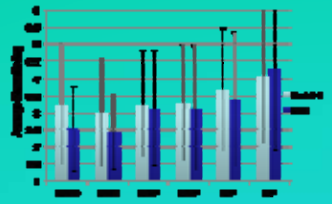
Overall, university students with a history of MHI relative to their no MHI cohort, were more likely to endorse direct physical transgressions, F (1,81) = 2.76, p < .10 (trend) – i.e. rated greater propensity to commit intentional moral transgressions leading to physical harm.

HYPOTHESIS 3

Despite scoring higher on components of psychopathy (erratic lifestyle, antisocial behaviour, & callous affect) as well as endorsing greater intentional moral transgressions leading to physical harm, individuals with a history of MHI report themselves as better problem solvers than their no MHI cohort, F (1,49) = 1.63, p > .05.

HYPOTHESIS 4





The MHI group was relatively underaroused compared to those without a history of head injury. Collapsed across different conditions, individuals with a history of MHI showed a reduced pulse rate, F (1,47) = 3.35, p < .07 (trend), relative to their no MHI cohorts. Furthermore, they reported significantly lower stress than the no-MHI groups even as the severity of transgression outcome increased, F (1,79) = 3.048, p < .02.

Discussion

Current findings challenge the dichotomy between brain and head injury and suggest that even subtle trauma to the head, in the absence of major neuronal loss, can cause differential responding amongst participants. Consistent with our hypotheses, participants reporting a history of mild head injury scored higher on not only secondary psychopathy scales (erratic lifestyle and anti-social behavior) in line with previous literature[14], but also primary psychopathy (callous affect). Interestingly, despite reporting greater likelihood of taking riskier decisions and anti-social behavior, while endorsing more direct-physical moral transgressions (and providing less justification in reaching those decisions), individuals with a history of MHI report themselves to be better problem solvers relative to their no MHI cohorts. This may reflect the lack of insight observed in individuals with more serious brain injury[7,15]. Furthermore, we replicated previous findings from our lab[16,.17] and found that individuals with a history of MHI were physiologically underaroused relative to their noninjured peers. By targeting a competent university sample, our findings suggest that it is not a matter of intellect but emotional input that guides decision making in ambiguous and emotionally pressing social (or moral) situations, putting such individuals at risk of physical/emotional harm within the social domain. While only some of our findings were significant, due to low power with only 10 subjects reporting a history of head injury, they are all in the expected direction and reflect promising trends.

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