The Effects of Mild Head Injury and Induced Stress on Cognitive Performance
Young Hee Jung & Dawn Good, Ph.D., C.Psych.
Brock University, St. Catharines, Ontario

Introduction
- Mild Head Injury (MHI) is defined as a hit to the head which is sufficient to cause an altered state of consciousness such as dizziness, nausea, headaches, vomiting, disorienting, visual disturbances, and loss of consciousness.

- Mild Head Injury (MHI) primarily involve the frontal lobe due to structural vulnerability (proximity to boney ridges of skull). Impact typically results in both initial and rebound injuries. The Impact of head injury, at least in terms of moderate and severe brain injury, can significantly impair frontal lobe cognitive functions.

In addition,
- Stress has adverse effects on cognitive functions and various stressors in everyday life can profoundly affect an individual's functional status.
- University life is stressful due to exams, assignments, social, financial and personal difficulties.

Purpose
- No studies have been conducted that assess the combination of impact of stress on mild head injury in highly functioning, and often highly stressed, university students.

- Unawareness of having sustained a mild head injury and its effects are profound in that stress and mild head injury intervene in the students' school life (academic achievement, social and behavioural functions).

Hypotheses
1. Increased stress will be detected by both physiological (heart rate and blood pressure) and self-reported stress measures (stress rating, life event stressors, state and trait anxiety).

2. Induced stress will impair cognitive performance on measures of attention, working memory, visual discrimination and abstract reasoning – i.e. measures of frontal lobe function.

3. Persons with MHI will be less able to manage stress and, therefore, be even more disadvantaged on measures of cognitive performance, especially those associated with frontal lobe function.

Method
Participants & Procedures
- 44 females, 16 males undergraduate students
- 17 – 30 years of age (M = 19.9, SD = 3.78)

Physiological Measures
- Blood Pressure – measures effort; prolonged stress increases the discrepancy between the Diastolic and Systolic measures
- Heart Rate – measures immediate oxygen intake; environmental stress increases beats per minute

Results
State – trait anxiety:
MHI = nonMHI group
BP (systolic – diastolic):
MHI > nonMHI

Conclusion
- HR represents arousal (reaction to environment/stress) and reported stress measures one's awareness of stress. In both cases, MHI group is underaroused as compared to nonMHI - not reacting to/alert to any stressor

- BP is an indice of constituent response to stressors and the resultant effort/toll on the body - and indicates that the MHI group, in fact, has a physiological cost in terms of stress, despite being underaroused.

Further,
- Whereas, increased stress does lead to impaired attentional performance in the nonMHI group, the MHI group is advantaged by more arousal (attentional performance improves).

The Yerkes – Dodson curve can provide an explanation:
- When the nonMHI group increases from optimal arousal -> too much (low vs. high reported stress) = performance decreases
- When the MHI group (underaroused HR; even though chronically stressed BP) moves from low alertness to increased levels of (optimal) arousal = performance improves