

## Introduction

A high prevalence of mild traumatic brain injury (mTBI) is present among individuals that have experienced an acute traumatic event such as a motor vehicle accident or physical assault. These types of traumatic events are known to result in post-concussion symptoms (PCS), like headache, dizziness, vomiting, etc., and acute post-traumatic stress symptoms including re-experiencing of trauma, avoidance of trauma-related cues, arousal/reactivity, and negative alterations. High levels of acute post-traumatic stress symptoms lasting over 1 month, following initial trauma, can develop into post-traumatic stress disorder (PTSD) symptoms. Literature suggests that mTBI is associated with increased risk of developing PTSD when compared to individuals with no mTBI. It has been proposed that mTBI may lead to increased acute stress symptoms that contribute to the development of PTSD symptoms in subsequent post-trauma months. The relationship between these 3 elements, however, remains untested. This study looks to examine if the presence of mTBI, as a result of a traumatic event, increases acute stress symptom severity, which in turn associates with PTSD symptom severity at 3 months following trauma.

## Methods

- Subjects in this study were recruited from the emergency rooms (ER) of local hospitals in Toledo, OH
- Level two and above trauma patients, who visited the ER within 48 hours, were selected and consented
- A mTBI diagnosis was made based on subject's medical records using the American Congress of Rehabilitation Medicine criteria
- Subjects were grouped to mTBI and non mTBI groups at the time of their recent index trauma
- Subjects were then given surveys within 2 weeks and at 3 months post-trauma. Surveys included the following:

**Acute Stress Disorder Scale (ASDS):** Initial survey questionnaire taken within 2 weeks following a traumatic event to assess acute post-traumatic stress symptom severity.

**Rivermead Post-Concussion Symptoms (RPCS):** Initial survey questionnaire taken within 2 weeks following a traumatic event to assess post-concussion symptom severity. Used as more of a confirmatory measure for the presence of mTBI.

**Posttraumatic Stress Disorder Checklist (PCL\_3m):** Follow-up survey questionnaire taken at 3 months following a traumatic event. This is a self report measure used to help in the diagnosis of PTSD or gauge PTSD symptom severity.

- A univariate ANOVA analysis was conducted to compare ASDS, RPCS, and PCL scores between the mTBI group and non mTBI group
- A moderated mediation analysis was used to test the relationship between RPCS and PCL with ASDS as a mediator and mTBI groupings as a moderator
- All of the statistical models were controlled for age and gender

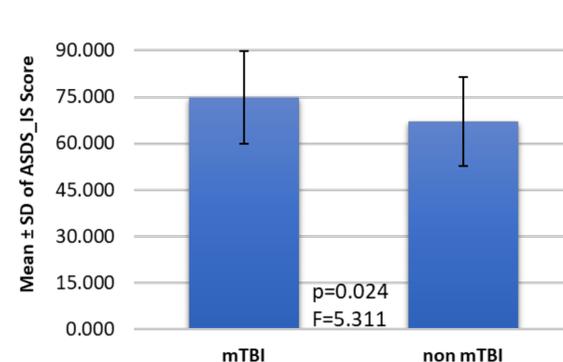
## Results

**Table 1: Demographics and Univariate ANOVA analysis**

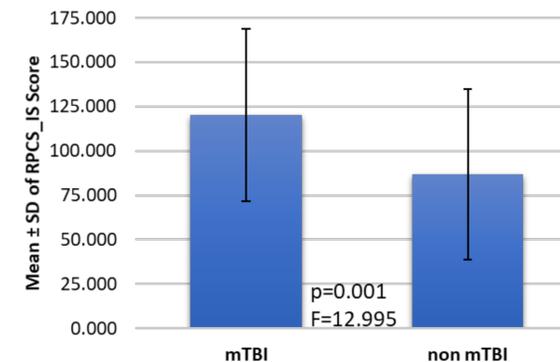
	mTBI	non mTBI				
<b>Total n</b>	n=24	n=74				
<b>sex</b>	10 F/ 14 M	45 F/29M				
	mean±SD	mean±SD	F or T value	P value	n (mTBI)	n(non mTBI)
<b>Age</b>	31.63 ± 10.721	32.19 ± 10.527	0.227 (T)	0.821	24	74
<b>ASDS Score</b>	74.84 ± 14.982	67.11 ± 14.471	5.311 (F)	0.024*	19**	57**
<b>RPCS Score</b>	120.17 ± 48.508	86.89 ± 48.100	12.995 (F)	0.001*	23**	63**
<b>PCL Score</b>	38.89 ± 19.569	33.40 ± 19.016	1.890 (F)	0.174	18**	52**

\* significant p values (p<0.05), \*\*n values vary depending on which survey was analyzed

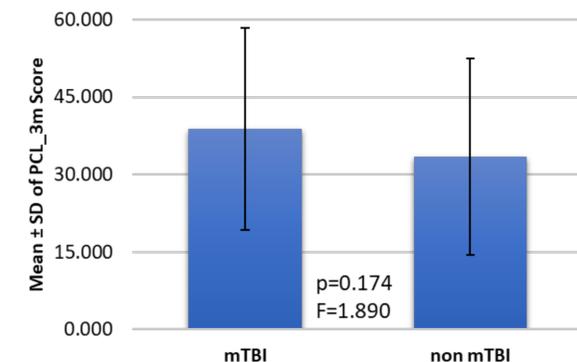
**Figure 1: A significant difference in ASDS scores between mTBI and non mTBI patients**



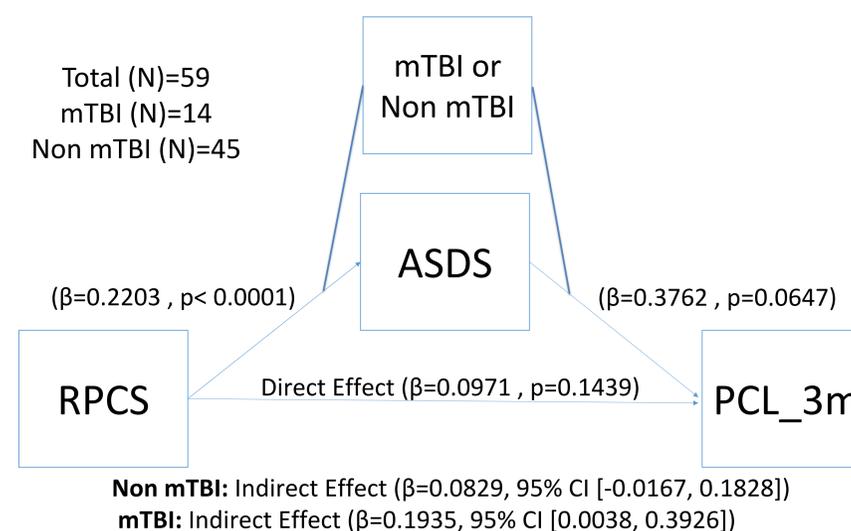
**Figure 2: A significant difference in RPCS scores between mTBI and non mTBI patients**



**Figure 3: No difference in PCL scores between mTBI and non mTBI patients**



**Figure 4: Moderated mediation analysis showing the relationship between RPCS and PCL with ASDS as a mediator and mTBI groupings as a moderator**



- Results showed that the indirect effect was significant only in the moderated mediation analysis with mTBI positive grouping

## Conclusions

- The presence of mTBI after an acute traumatic event may lead to greater post-concussion symptom and acute stress symptom severities in the acute phase
- There was no significant difference in PTSD symptom severity between the mTBI and non mTBI groups
- Acute stress disorder symptoms may mediate the relationship between mTBI symptoms at 2 weeks (reflected by RPCS) and PCL scores at 3 months among only mTBI positive individuals
- These findings support that mTBI may increase PTSD symptom severity by exacerbating acute stress symptoms within days to weeks after trauma

## Future Directions

- Further recruitment of patients into the study in order to increase sample size for all analyses.
- For mTBI patients, interventional techniques could be developed to reduce acute stress disorder symptom severity to potentially prevent PTSD development

## Acknowledgements

- NIH: 5R01MH110483.