# Effects of preexisting conditions on short-term outcome in traumatic brain injury

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## **Abstract**

University

This study aims to increase our understanding of the relationship between preexisting conditions (PEC) and short-term outcome in TBI. In moderate TBI, a significant difference was found in the number of hospital days for +PEC (M=11.5, SD=12.8) and -PEC (M=14.5, SD=17.4); t(569) = -2.63, p < 0.01, d = 0.15. In severe TBI, a significant difference was found in Functional Status at Discharge for +PEC (M=13.8, SD=5.86) and -PEC (M=14.3, SD=5.66); t(1066) = -2.00, p < 0.05, d = 0.09.

## Introduction

- Additional health complications in traumatic brain injury (TBI) may be attributable to PECs.
- Presence of hypertension or other heart conditions, diabetes mellitus, and respiratory conditions have been shown to affect one's neurocognitive recovery from TBI (Dahdah et al., 2014).
- This study aims to advance our understanding of the relationship between preexisting conditions and shortterm outcome in moderate and severe TBI.
- Primary hypothesis: The presence of PECs will be associated with poorer short-term outcome and increased odds of fatality.

# **Methods & Analyses**

- The Pennsylvania Trauma Outcome Study (PTOS) was refined to include only cases of interest. This database contains de-identified reports of trauma in the state of Pennsylvania from years 1992 to 2009.
- An independent-sample t-test was conducted on Glasgow Coma Scale (GCS; Teasdale & Jennett, 1974) scores on those with preexisting conditions (+PEC) and those without preexisting conditions (-PEC) for each sample. Independent-sample t-tests were also completed using outcome variables between +PEC and –PEC in each sample.
- Outcome variables included number of days in an Intensive Care Unit (ICU), number of days in a Step Down Unit (SDU), total hospital days, and Functional Independence Measure (FIM; Hamilton et al., 1987) within 48 hours of discharge.
- FIM scores were obtained using the sum of five measures independence, ranging from zero (completely dependent) to four (completely independent), within 48 hours of discharge. FIM measures included feeding, locomotion, expression, transfer mobility, and social interaction.
- A binary logistic regression was conducted on each sample to assess the influence of PEC on fatality while controlling for age, sex, and GCS score.
- Statistics were completed using SPSS, version 22.

# Sample Demographics

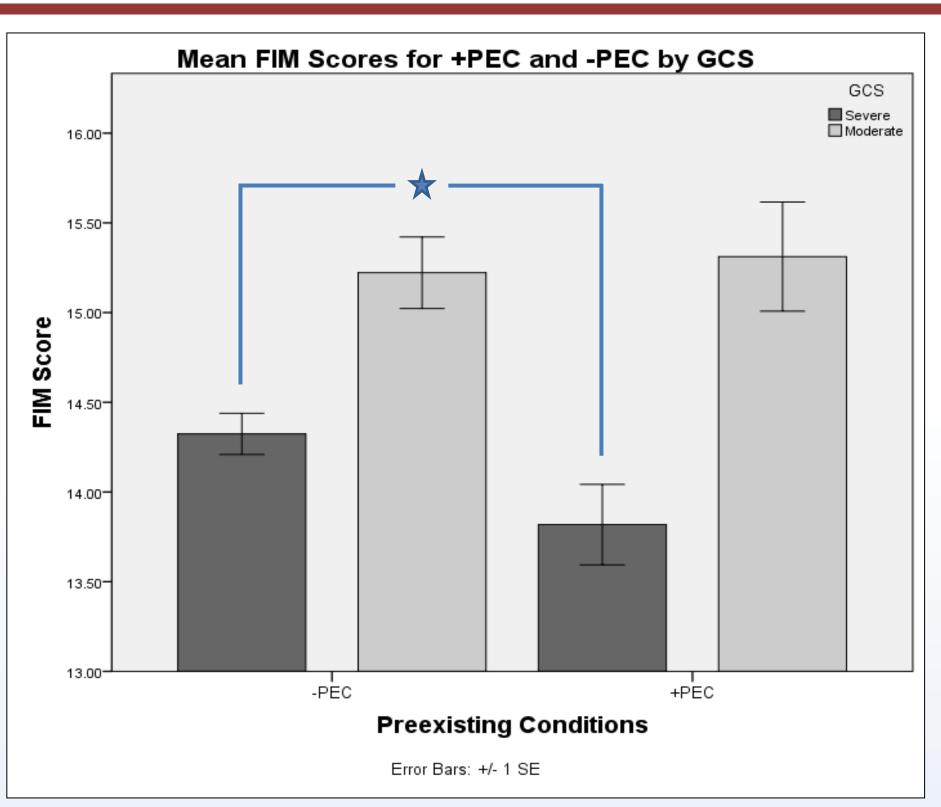
- A sample of 4,110 TBI cases of moderate to severe blunt head injury between the ages of 18 and 102 (M = 37.53) were included.
- Individuals could have no more than one PEC, and must have tested negative for alcohol and drugs at the time of injury.
- GCS scores were used to split the sample into moderate (GCS 9-12) and severe (GCS < 9) TBI.

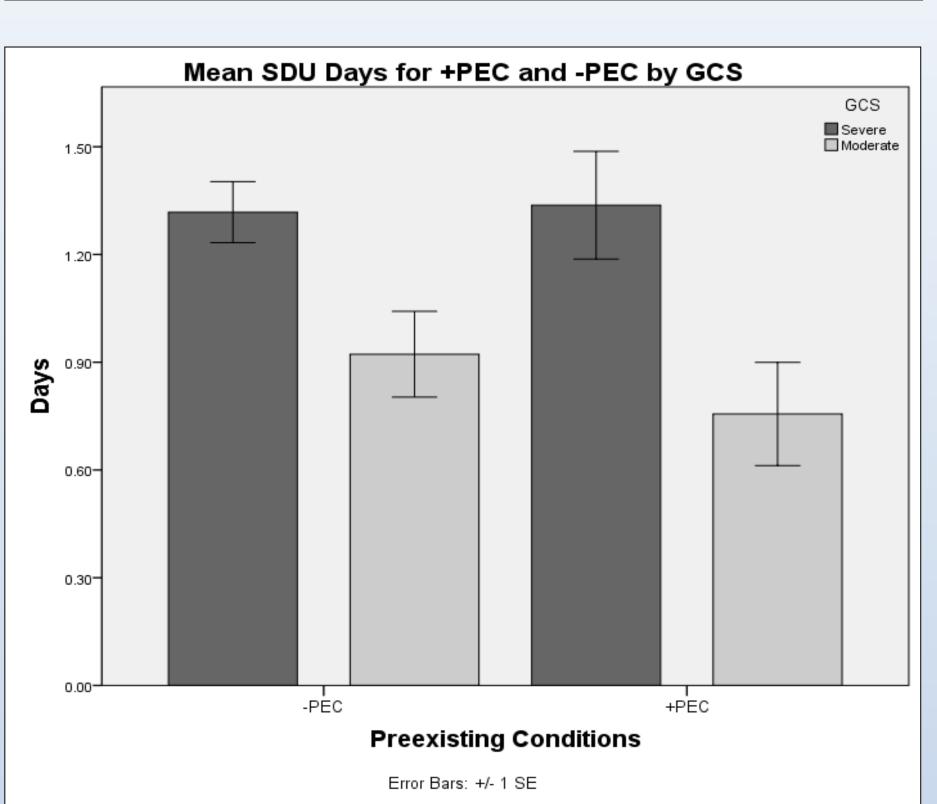
PTOS Filters	n				
Original Database	60,942				
1.) Non-blunt trauma	49,684				
2.) Small sample PEC	38,358				
3.) Positive for intoxication	30,853				
4.) Number of PECs > 1	23,739				
5.) GCS > 12	10,356				
6.) Age < 18	7,761				
7.) Discharged to burn center	7,757				
8.) Unknown gender	7,756				
9.) "Do not resuscitate"	4,110				

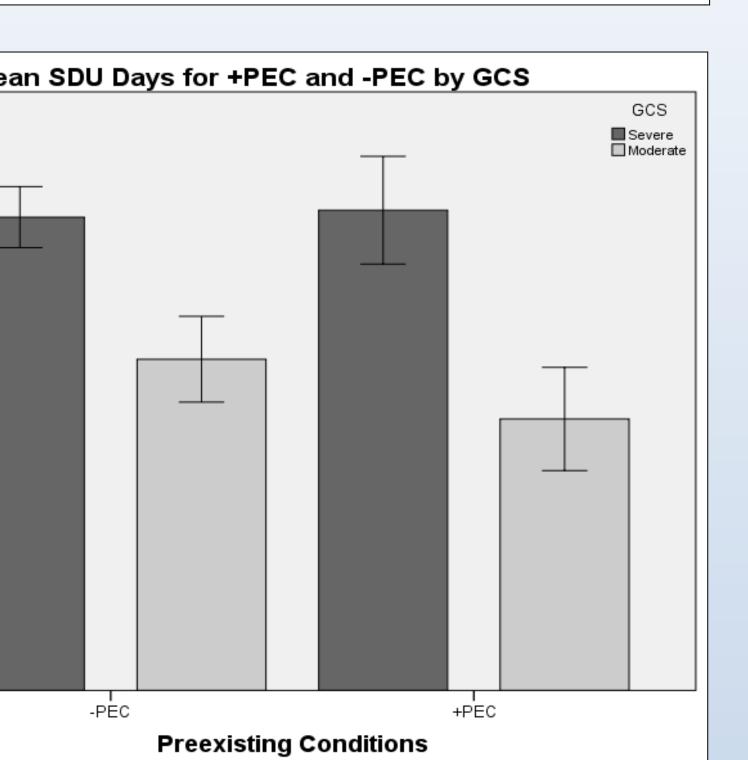
Mean Hospital Days for +PEC and -PEC by GCS

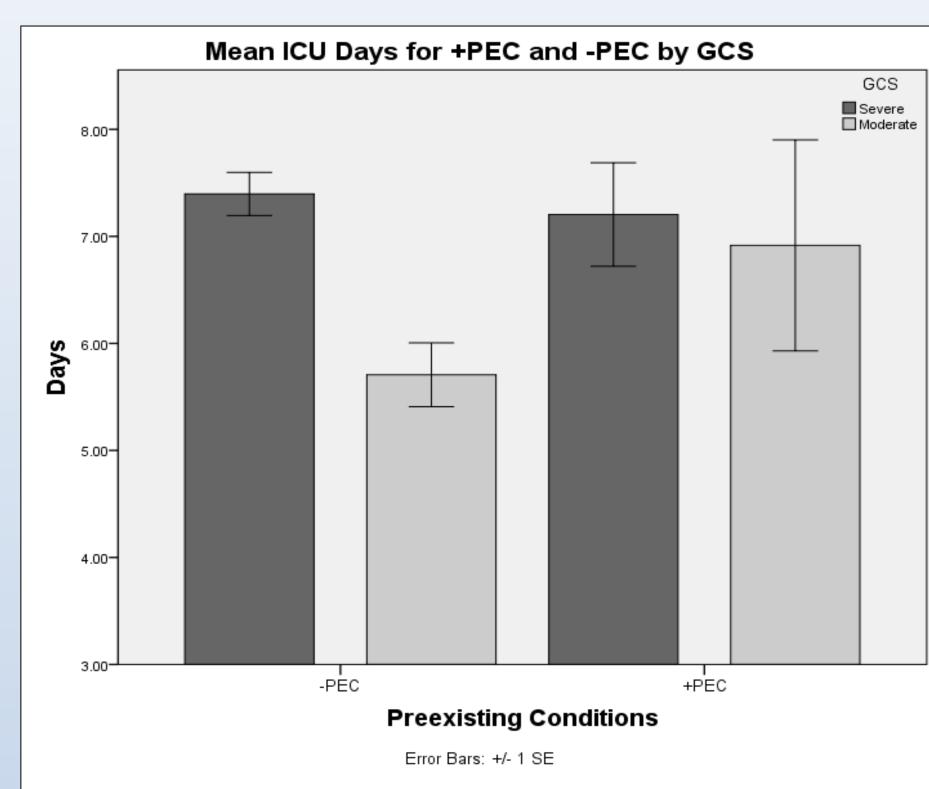
	n	Mean Age	Male	Female	Discharged Alive	Patient Expired	% Fatility	Mean GCS Score	Mean ICU Days	Mean SDU Days	Mean Hospital Days	Mean FIM
-PEC	3133	35.02	2304	829	2379	754	24.07	6.04	7.01	1.23	16.18	14.53
+PEC	977	45.59	673	304	759	218	22.31	6.57	7.12	1.16	14.64	14.27
TOTAL	4110	37.53	2977	1133	3138	972	23.65	6.16	7.04	1.21	15.82	14.47

## Results









**Preexisting Conditions** 

Error Bars: +/- 1 SE

	В	S.E.	Wald	df	Significance	Exp(B)	95% Confidence Interval for Exp(B)		
							Lower	Upper	
Age	0.033	0.002	194.724	1	0.000	1.034	1.029	1.039	
Sex (M)	-0.096	0.091	1.113	1	0.292	0.908	0.759	1.086	
GCS	-0.420	0.019	471.367	1	0.000	0.657	0.633	0.682	
+PEC	0.326	0.104	9.899	1	0.002	1.385	1.131	1.697	
Constant	-0.439	0.180	5.911	1	0.015	0.645		_	

# Conclusions

- Inconsistent with our hypothesis, cases of moderate TBI with +PEC showed fewer overall hospital days than those with -PEC (d = 0.15). Reasons for this effect are not yet clear.
- Individuals with severe TBI had a significantly lower FIM scores if their injury was coupled with a PEC (d = 0.09). It is possible that an effect of premorbid functioning could account for this difference.
- Consistent with our hypothesis, +PEC individuals were shown to have higher fatality rates, Exp(B) = 1.385, p = 1.3850.002, 95% CI [1.131, 1.697].
- Future studies should examine the effect of specific types of PECs (e.g., cardiovascular, neurological, etc.) on fatality rates.

#### Limitations

GCS

Severe Moderate

+PEC

- The short-term outcome measures limit our ability determine an individual's long-term outcome trajectory. Future studies should measure long-term outcome by assessing cognitive, motor, and sensory deficits.
- These data do not contain measures of premorbid functioning beyond the absence or presence of PECs. Future studies should also consider premorbid functioning as a baseline for outcome analyses.

## References

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- PTOS DISCLAIMER: THESE DATA WERE PROVIDED BY THE PENNSYLVANIA TRAUMA SYSTEMS FOUNDATION, MECHANICSBURG, PA. THE FOUNDATION SPECIFICALLY DISCLAIMS RESPONSIBILITY FOR ANY ANALYSES, INTERPRETATIONS, OR CONCLUSIONS. CREDIT MUST BE GIVEN TO THE PENNSYLVANIA TRAUMA OUTCOME STUDY (PTOS) AS THE SOURCE OF DATA.

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