



The effect of traumatic stress with TBI on the susceptibility of developing PTE

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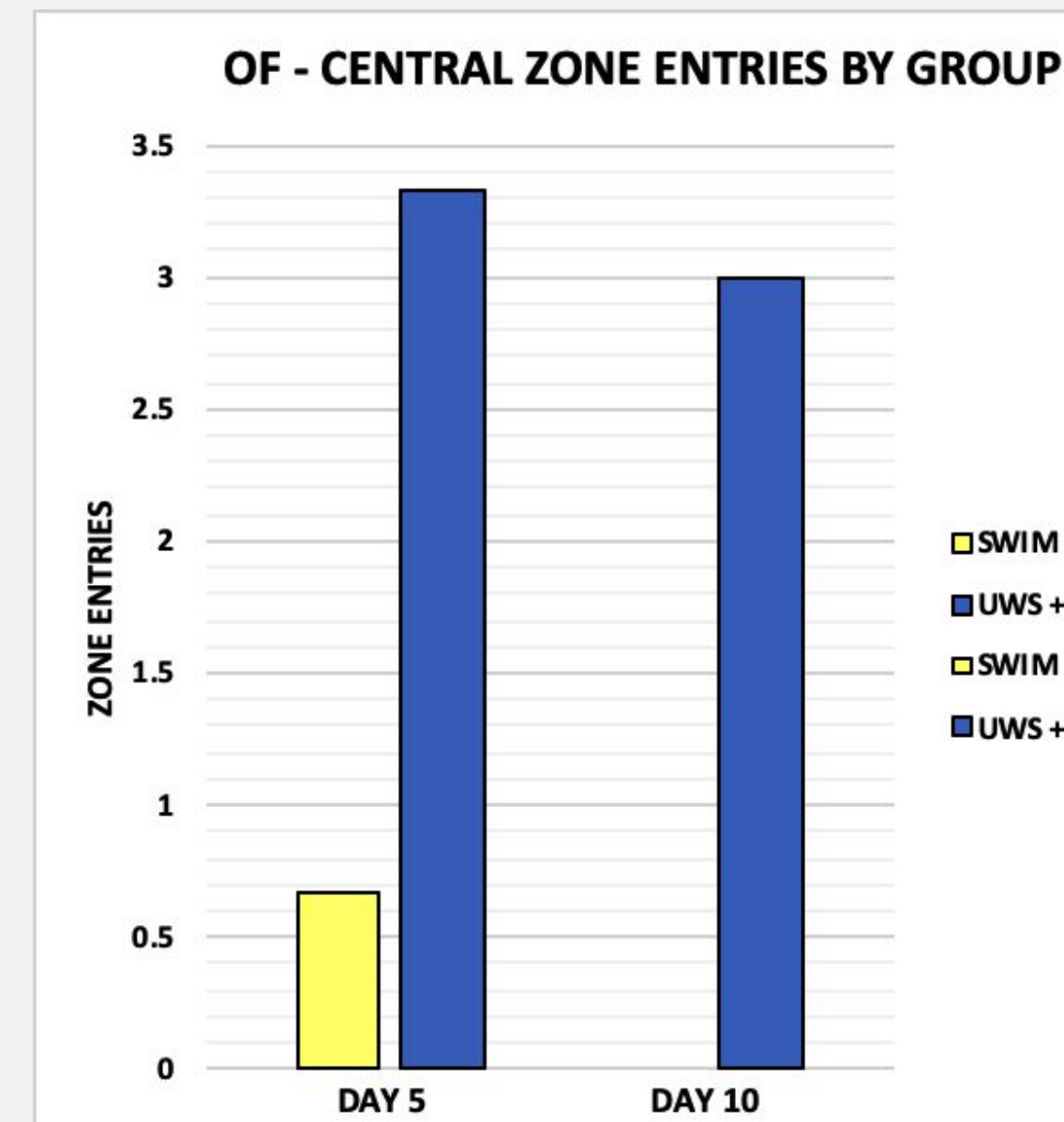
INTRODUCTION

- 2010 CCD report shows that traumatic brain injury (TBI) accounted for about 2.5 million hospital visits and about 5.3 million persons are living with a TBI-related disability in the US based on.
- TBI can lead to epileptogenesis with the development of post-traumatic epilepsy (PTE)
- PTE is defined by recurrent unprovoked seizures occurring after brain contusion
- Epileptogenesis- time between injury and first unprovoked seizure
- Characterized by neuronal loss, structural reorganization and increased excitation mediated by NMDA receptors within the hippocampus
- TBI is commonly associated with stress
- Severe stress at time of TBI potentiates the disease progression and increases likelihood of developing PTE.
- Effect of stress on development of PTE is yet to be examined

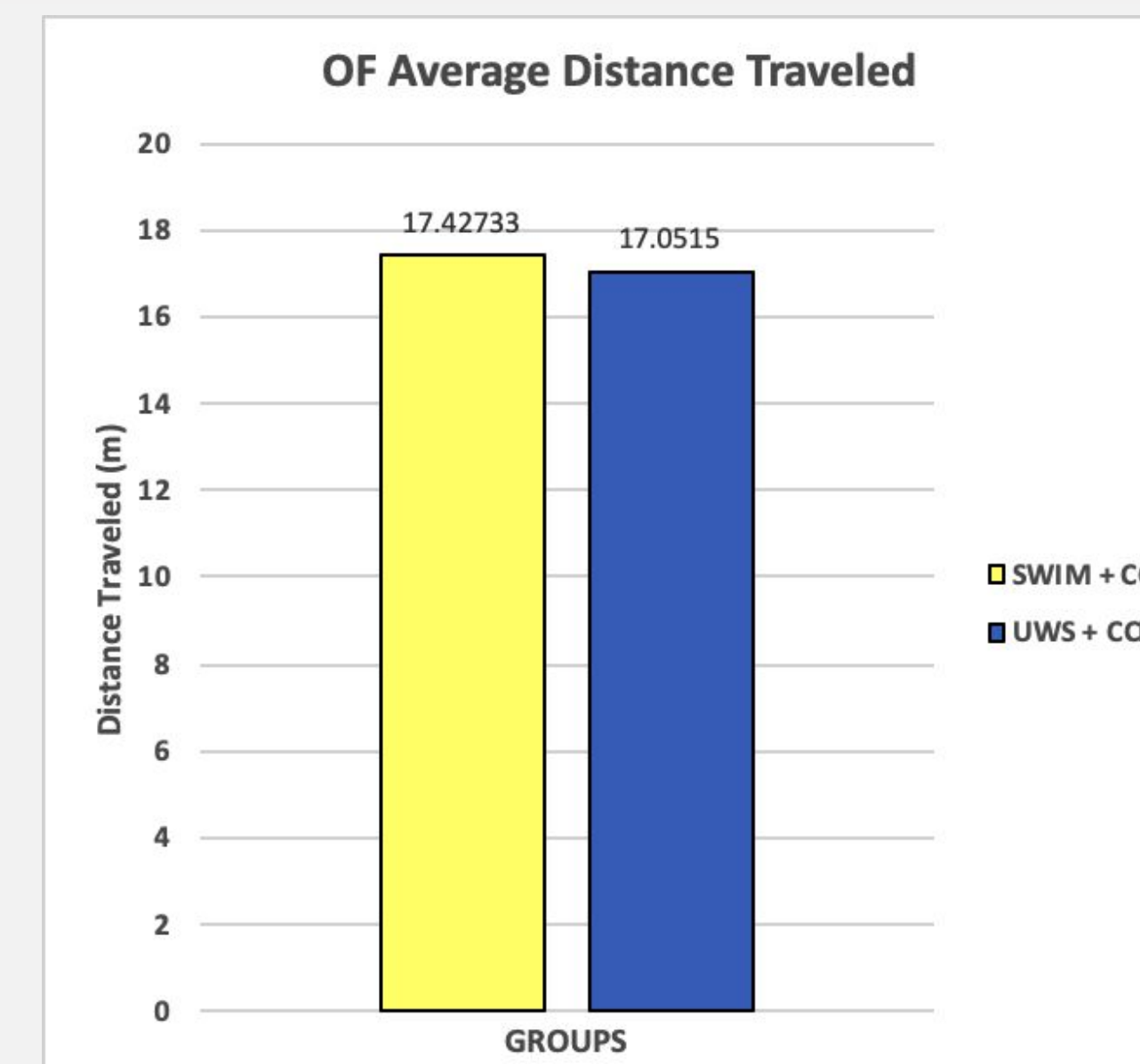
HYPOTHESIS

Traumatic stress, which occurs at the time of traumatic brain injury, increases susceptibility to seizures during the period of epileptogenesis.

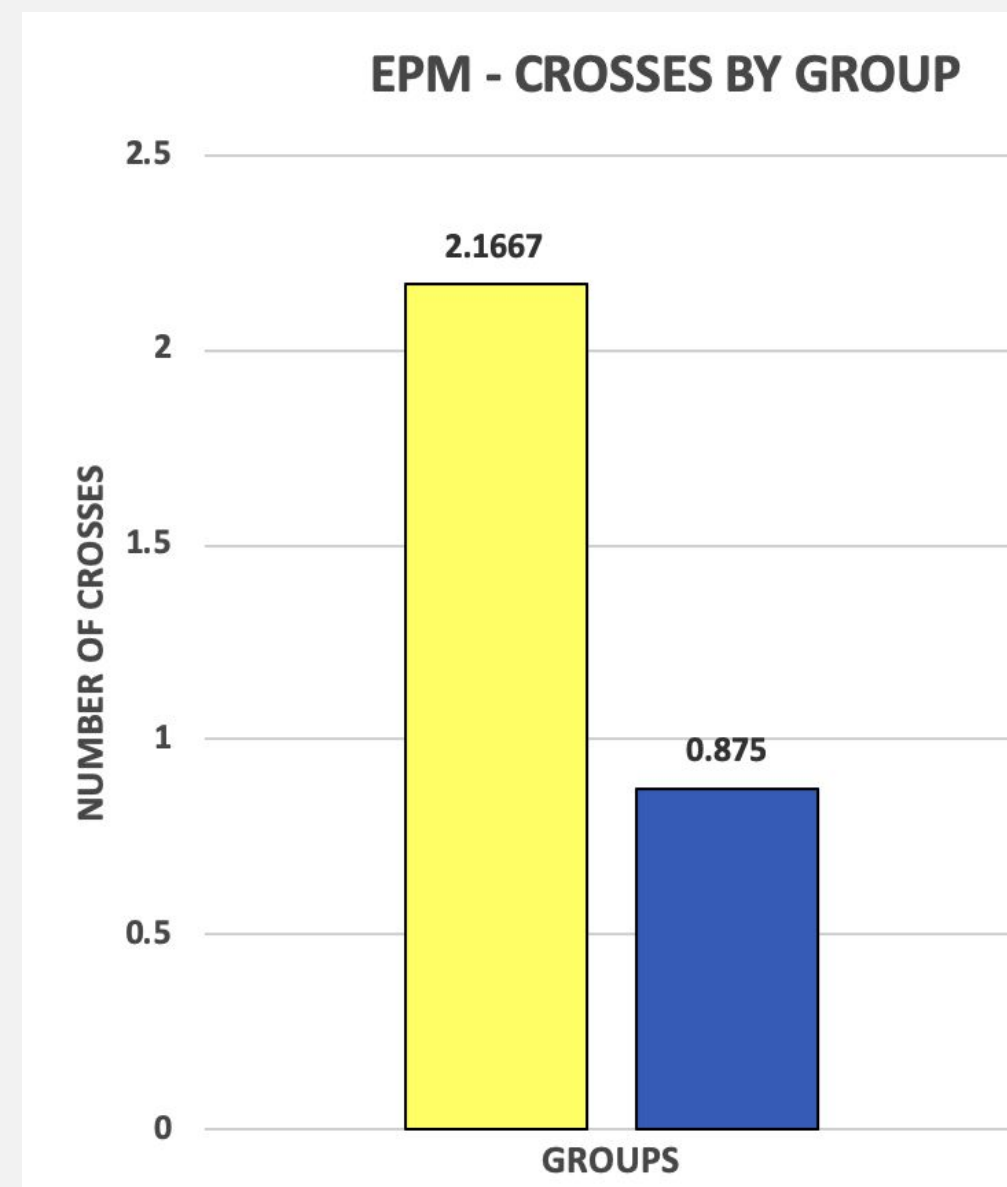
RESULTS



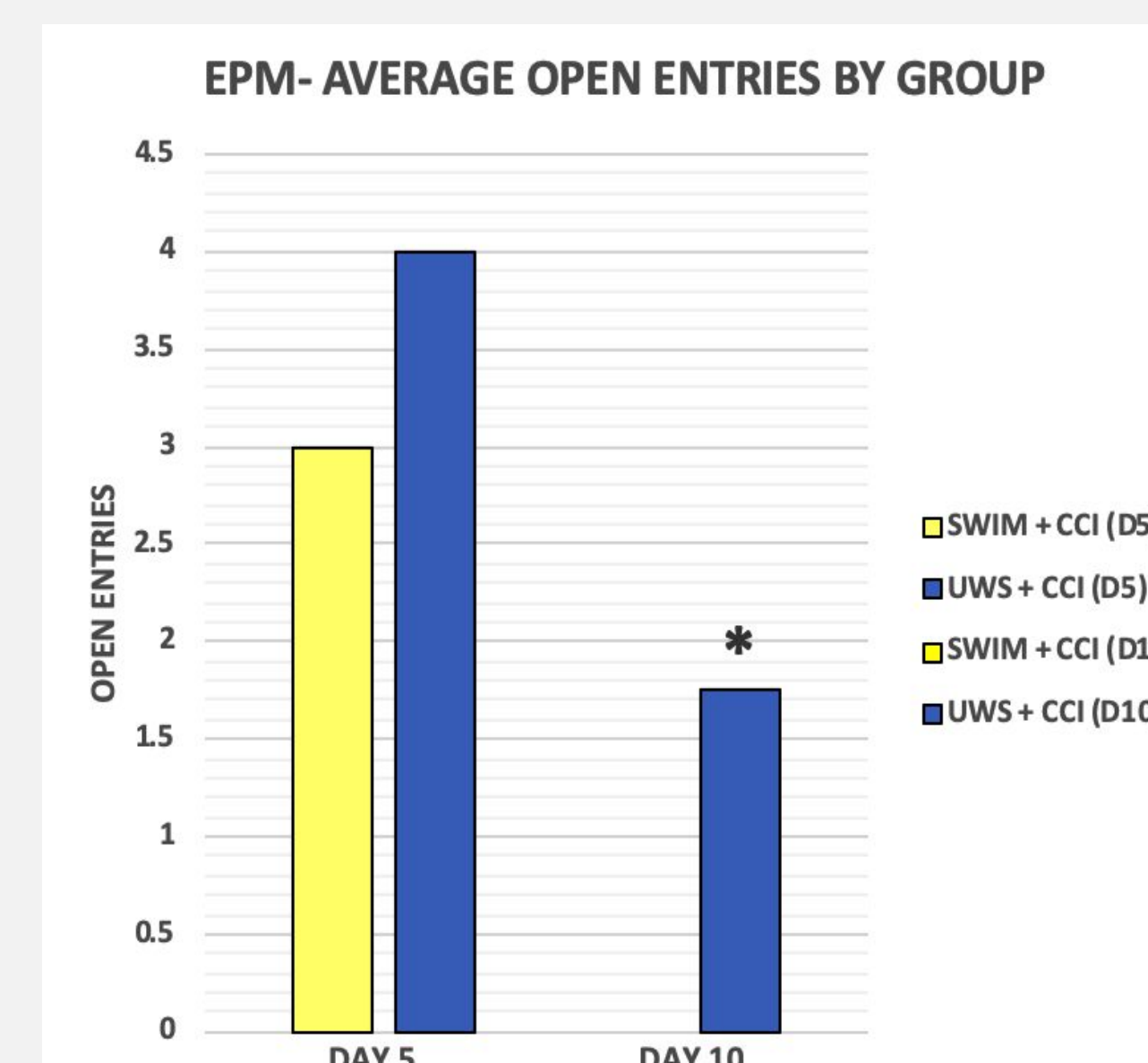
$P = 0.2331$
 $P = 0.0219$
Mann-whitney test



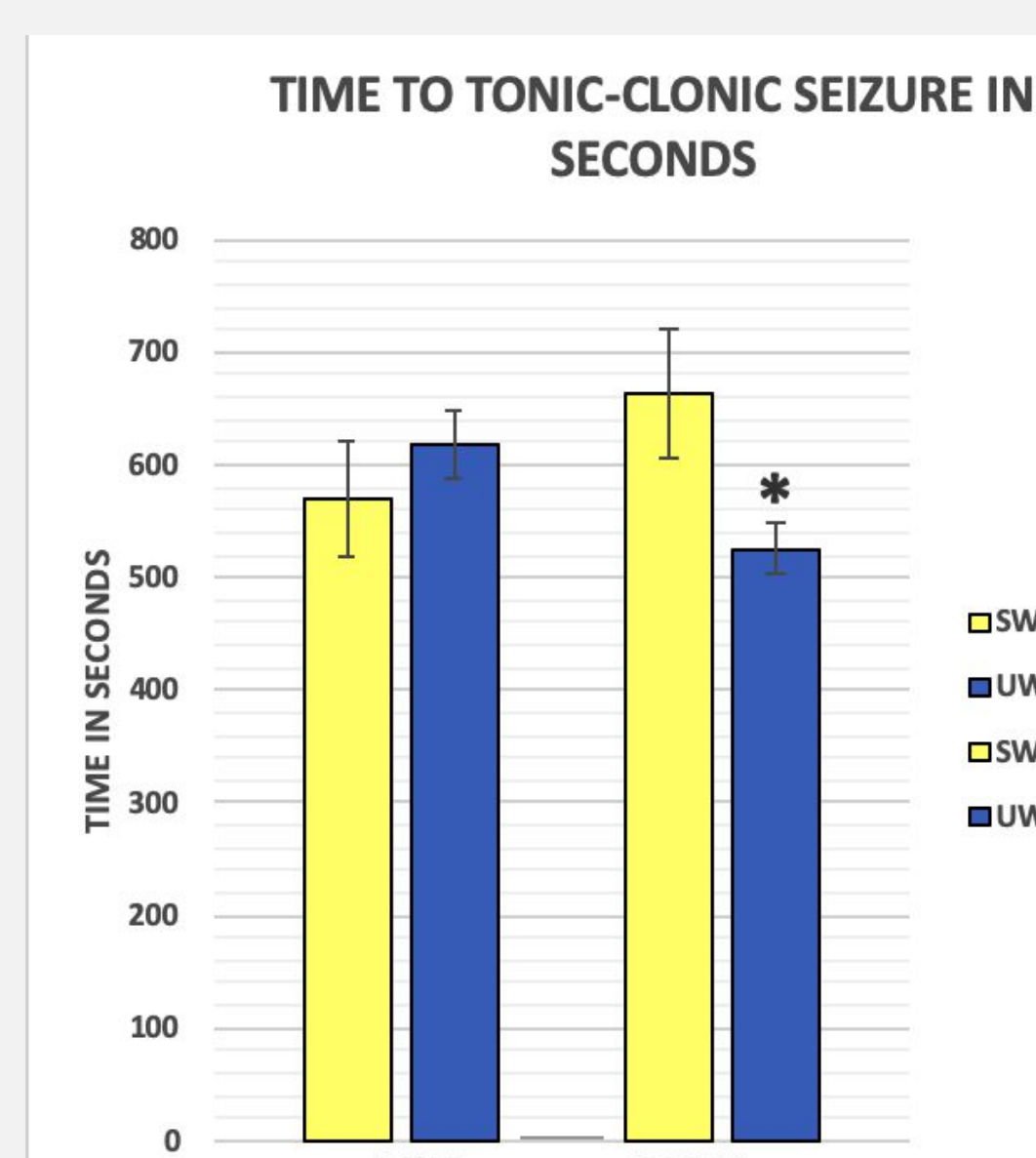
$P = 0.9129$



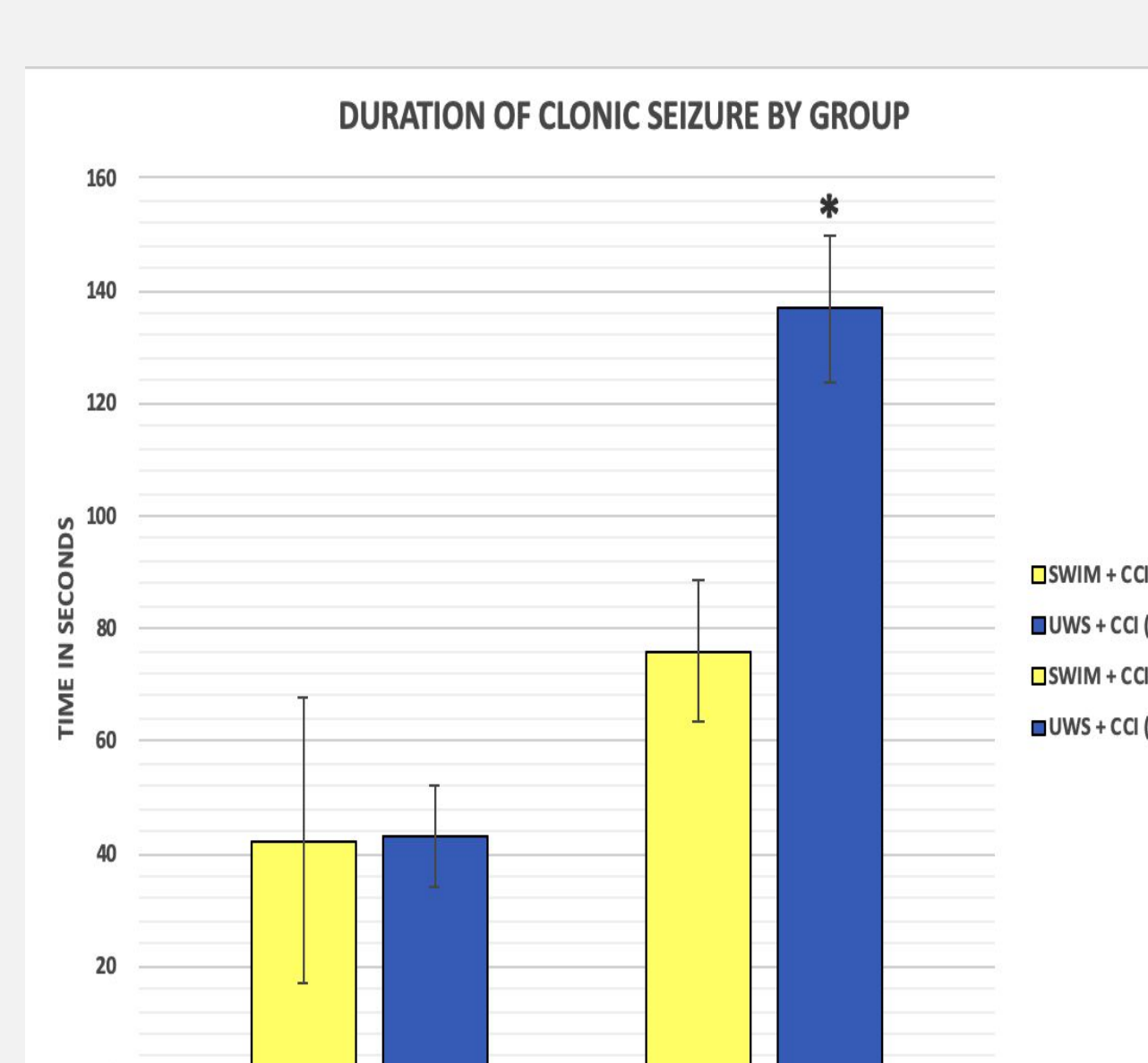
$P = 0.331$



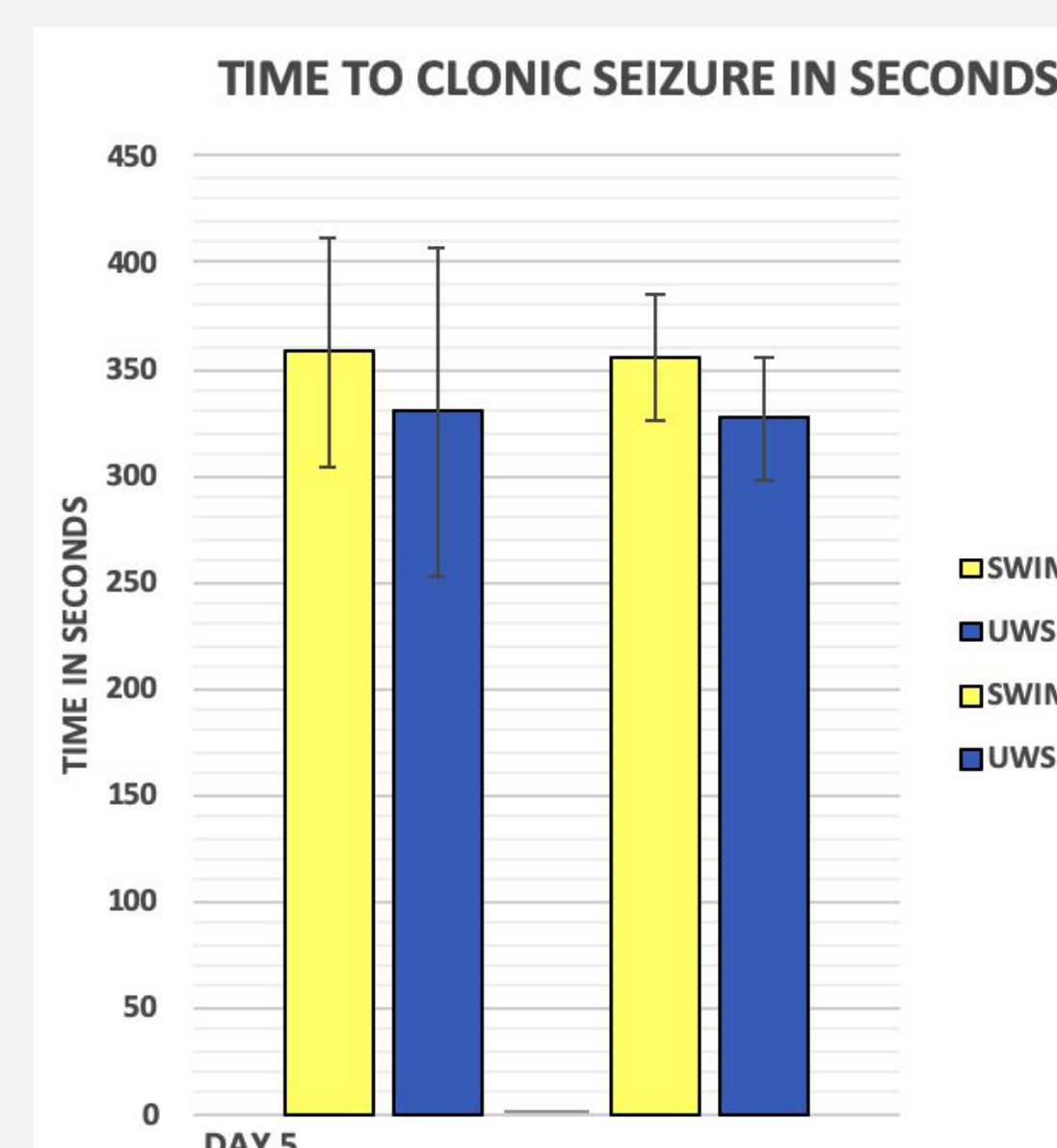
$P = 0.8457$
 $P = 0.0020$



$P = 0.4203$
 $P = 0.0257$
5 days post-injury, there was no significant difference.
10 days post-injury, traumatic stress group decreased proconvulsant threshold for tonic-clonic seizures.



$P = 0.9707$
 $P = 0.0274$
Animals exposed to traumatic stress during cortical contusion spent a longer period of time seizing compared to the control group. No significant difference on day 5.



$P = 0.7916$
 $P = 0.5866$

MATERIALS AND METHODS

TBI and Stresses

We stressed adult male rats by submerging them under water followed by cortical contusion using a weight drop. Control rats were placed in the water to freely swim and then received the cortical contusion.

Open Field Test & EPM Test

We tested the animals in an open field and elevated plus maze to determine changes in exploratory/locomotor activity and anxiety.

Flurothyl Test

We tested changes in seizure susceptibility in a flurothyl seizure model at two time points following the initial TBI and stress. At days 5 and 10 after TBI, we placed the rats in a flurothyl chamber using. Flurothyl was delivered at a constant rate until seizures developed.

CONCLUSIONS

- TBI in conjunction with traumatic stress increases susceptibility for tonic-clonic seizures compared to controls
- TBI in conjunction with traumatic stress leads to longer clonic seizures compared to controls
- TBI may be a prominent cause in the development of PTE for rats as well as humans