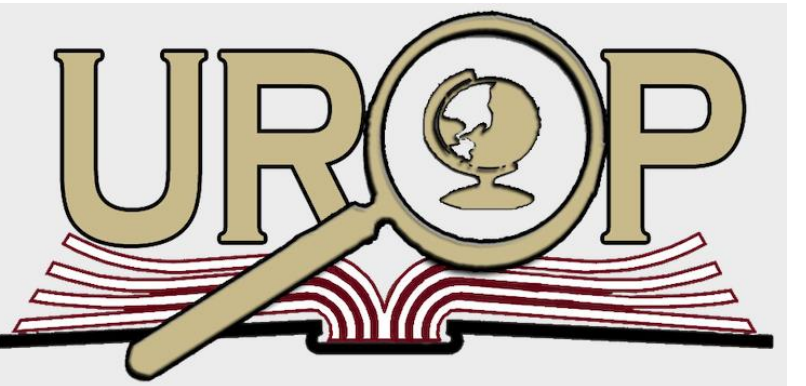




# Examination of Tonic Immobility in a Lab-Based Experimental Paradigm

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## Introduction

### What is tonic immobility (TI)?

- Freezing or “attentive immobility” is a common defensive behavior upon initial threat detection (Bradley et al., 2001; Lang et al., 1997).
- Additionally, trauma exposure in humans may impact future autonomic responses associated with immobility in the presence of a threat (Volchan et al., 2011).
- Recent studies implicate TI as a possible mediator in the relationships between fear, dissociation, and trauma-related symptoms resulting from events involving a perceived inescapable threat (Bovin et al., 2008; Fuse et al., 2007; Humphreys et al., 2010).

### Why study tonic immobility (TI)?

- Understanding the physiological responses and cognitive experiences associated with TI is an important step in improving treatment for trauma survivors who experience TI as a defense strategy, not only during the trauma but subsequently in daily life.
- The current study aims to examine associations between self-reported TI experiences and freezing behavior, measured by reductions in postural sway among trauma exposed individuals.

## Method

### Participants

- Age ( $M=18.87$ ,  $SD = 1.14$ )
- Trauma-exposed participants recruited from SONA subject pool.

Participant Demographics	N=98
<b>Self-identified Gender</b>	
Female	75.5%
Male	23.5%
Non-Binary	1.0%
<b>Self-identified Race</b>	
White	91.8%
Black	5.1%
Asian	2.0%
Hispanic	18.4%
Other	1.0%
Prior TI Experience	22.4%

### Measures

#### Tonic Immobility Questionnaire (TIQ-R)

10 item self-report measure; Responses assessed tonic immobility across a range of traumatic events (Taylor, Stapleton, & Asmundson, 2007).

- Sample item: “Rate the degree to which you froze or felt paralyzed during your most recent experience.”

#### Attentional Control Scale (ACS)

20-item self report measure; Responses recorded on a 4-point Likert scale (1= almost never, 4= always) assessed participant attention focusing and attention shifting.

Sample item: “When I am doing something, I can easily stop and switch to some other task.”

### Procedure

- Participants from an Introductory Psychology course (PSY 1012) voluntarily completed self-report measures and an image viewing task for SONA research credit.
- Image viewing task
  - Participants viewed a series of neutral and mutilation images from the International Affective Picture System (Lang, Bradley, & Cuthbert, 1999).
  - Three blocks (neutral, pleasant, unpleasant) of images (24 each) are presented in randomized order.
  - Participants viewed each image for 3 seconds for a total time trial of 3.6 minutes.
  - Assessment of standing balance and postural sway was measured through the validated Nintendo Wii Balance Board (WBB) (Clark et al., 2010).

### Data analysis

- Data were analyzed using descriptive statistics to characterize the sample population after accounting for attentional control.
- Linear regressions were used to examine the relationship between prior TI experience and TI in response to the image viewing paradigm.

## Abstract

Research in the area of threat responding has modeled a continuum of autonomic, survival-based behaviors including the stages of freeze, fight, and flight (Barlow, 2002; Bradley et al., 2001; Lang et al., 1997). Tonic immobility (TI) is a type of freeze response characterized by continued motor and vocal inhibition. The present study aims to gain a better understanding of the physiological reactions and subjective experiences of TI by examining the associations between self-reported TI and postural sway in participants with previous trauma exposure. Participants completed self-reported measures assessing tonic immobility experienced during the individual’s worst trauma, across stressful experiences, and in response to a laboratory-based task, among other psychological correlates. The image-viewing task consisted of a series of neutral and affective images while assessing for postural sway recorded through the Nintendo Wii Balance board (WBB). Multiple linear regression analyses indicated prior experience of TI significantly predicted a reduction in postural sway when viewing mutilation images as opposed to neutral and positive images, as well as significantly predicting self-reported tonic immobility. Understanding the motor attribute of TI holds implications for future research examining freeze responses in trauma-exposed populations.

## Results

Postural sway regressions ( $n = 40$ )

- Prior experiences of tonic immobility, when controlling for gender and attentional control, significantly predict decreases in postural sway when viewing mutilation images as compared to neutral images. However, it was not significant when compared to positive images.
  - $\Delta$  Neutral:  $t = -3.04$ ,  $\beta = -.48$ ,  $p = .004$
  - $\Delta$  Positive:  $t = -1.55$ ,  $\beta = -.26$ ,  $p = .130$

Table 1

Predicted Self-Reported TI During Image Viewing Paradigm

Variable	t statistic	$\beta$	p
Total	3.48	0.30	.001
Immobility	4.02	0.36	.001*
Dissociation	2.49	0.23	.015
Fear	1.95	0.23	.054

Note. Self-Report Regression ( $N=98$ ), Variables were controlled for gender and attentional control,  $*p < .001$

Table 1

- Prior experiences of tonic immobility, when controlling for gender and attentional control, significantly predict self-reported tonic immobility for total and subscales apart from fear which is trending.

## Discussion

### Discussion

- Data analyses conducted through multiple linear regressions exhibited prior experiences of TI as a significant predictor of self-reported tonic immobility when controlling for gender and attentional control.
- Both self-report and behavioral findings indicate that individuals who have experienced TI may be more likely to freeze in response to subsequent threatening scenarios.

### Limitations

- Small sample size for postural sway measures

### Implications & Next Steps

- Understanding the motor attribute of TI through the measurement of postural sway when shown threat-inducing stimuli may help us better understand the relationship between freeze response and PTSD symptoms in trauma survivors.
- Future studies could examine the role of re-exposure through stimuli in laboratory tasks in the relationship between prior TI experience and use of freeze response as a defensive behavior when exposed to a perceived threat in daily life.

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