

# **Tonic Immobility Does Not Uniquely Predict Posttraumatic Stress Symptom Severity**

## Introduction

- Tonic immobility (TI) is a temporary and involuntary physical paralysis in response to extremely stressful events. TI is posited to be an evolved physiological response to predation. It has been extensively examined in non-human animals (Gallup & Maser, 1977) but remains understudied in humans.
- Among humans, TI has been reported in trauma contexts that include sexual and physical assault, childhood sexual abuse, motorvehicle accidents (MVAs), armed robbery, trauma involving exposure to death, as well as air, naval and other disasters.
- TI is posited to be related to or overlapping with peritraumatic dissociation – a construct already demonstrated to be associated with the development of PTSD (e.g., Ozer et al., 2003).
- Several researchers (e.g., Bovin et al., 2008; Fiszman et al., 2008; Heidt et al., 2005; Lima et al., 2009; Rocha-Rego et al., 2009) have linked TI to worsened posttraumatic stress symptoms (PTSS); however, it remains unclear whether TI is uniquely predictive of worsened PTSS.
- This purpose of the current study was to clarify whether TI uniquely contributes to PTSS severity over and above associations already established for peritraumatic dissociation and trait anxiety.
- Given suggestions that TI and peritraumatic dissociation may be interrelated constructs (e.g., Heidt et al. 2005, Marx et al., 2008), we made no *a priori* predictions regarding the relationship between TI and PTSS severity.

Table 2. TI and PTSS: Multiple regression PCL-C reexperiencing scores dependent									
Model	Predictors	M (SD)	в	part r	<i>R</i> <sup>2</sup>	$\Delta R^2$	F	$\Delta F$	
1					.11		8.95**		
	STAI-T	47.66 (11.12)	.33**	.33					
2					.25	.14**	11.81**	13.17**	
	STAI-T		.29**	.29					
	PDEQ	29.09 (10.87)	.38**	.37					
3					.26	.01	8.19**	.95	
	STAI-T		.27*	.27					
	PDEQ		.32**	.27					
	ТІ	8.38 (5.06)	.12	.10					

*Note*. PCL-C reexperiencing scale descriptive statistics: *M*=13.27, *SD*=4.88 \**p*<.05, \*\**p*<.01.

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# Method

### Participants and procedure

- Participants were community members who reported TI during a traumatic event (*N*=75; 88% women; ages 18-65, *M*age=31.49, *SD*=12.21).
- TI, peritraumatic dissociation, trait anxiety, and symptoms of posttraumatic stress were assessed with an internet-delivered questionnaire battery as part of a larger investigation.

#### Measures

- *Tonic Immobility Questionnaire Revised* (TIQ-R: Taylor et al., 2007)
- *Peritraumatic Dissociative Experiences Questionnaire* (PDEQ; Marmar et al., 1997)
- State-Trait Anxiety Inventory (STAI; Spielberger et al., 1970); only the STAI-Trait scale was used in analyses
- *PTSD Check-list Civilian Version* (PCL-C; Weathers et al., 1994)

#### Analyses

- Hierarchical regression analyses were conducted to assess whether TI scores would account for variance in PCL-C symptom cluster scores over and above the influence of trait anxiety and peritraumatic dissociation.
- Consistent with recommended practice (Petrocelli, 2003), predictors were entered into the model in temporal order. Trait anxiety (a dispositional variable) was entered first, peritraumatic dissociation (posited to precede TI) was entered on the second step, and TI (the terminal defensive behaviour) was entered on the final step.
- To control for peritraumatic fear we included only TIQ-R items consistent with objective features of TI (e.g., legs paralyzed, voice weak, body frozen); TIQ -R fear items were excluded from analyses.

Table 3. TI and PTSS: Multiple regression PCL-C avoidance scores dependent									
Model	Predictors	M (SD)	в	part <i>r</i>	<i>R</i> <sup>2</sup>	$\Delta R^2$	F	ΔF	
1					.04		2.87		
	STAI-T	47.66 (11.12)	.20	.20					
2					.15	.11**	$6.14^{*}$	9.08**	
	STAI-T		.16	.16					
	PDEQ	29.09 (10.87)	.33**	.33					
3					.15	.00	$4.08^{*}$	.12	
	STAI-T		.15	.15					
	PDEQ		.31*	.27					
	TI	8.38 (5.06)	.05	.04					

*Note*. PCL-C avoidance scale descriptive statistics: *M*=5.78, *SD*=2.45 \**p*<.05, \*\**p*<.01.

Results
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- Initial analyses found no significant sex-differences on any predictor and dependent variables (all ps>.05).
- TI was reported in traumatic events that included physical and sexual assaults, motor vehicle and other accidents, exposure to death – primarily the unexpected death of a loved one. Less frequently reported events included armed robbery, dog attack, witnessing violent assault, and social confrontations.
- Bivariate correlations were calculated among predictors (TIQ) composite variable, PDEQ, STAI-T) and dependent variables (PCL-C subscales; Table 1).
- Results indicated that in all analyses trait anxiety, and especially peritraumatic dissociation, but not TI, were significant and substantive predictors of PTSS scores (Tables 2-5).

Table 1. TI and PTSS: Correlations among predictors and PCL-C subscales

	Predictors	1	2	3	4	5	6
1	PCL-C reexp						
2	PCL-C avoid	.66**					
3	PCL-C numb	.64**	.54**				
4	PCL-C hyp	.61**	.48**	.60**			
5	STAI trait	.33**	.20	.36**	.57**		
6	PDEQ	.41**	.35**	.46**	.40**	.12	
7	TI comp	.33**	.23*	.35**	.40**	.20	.50**

*Note*: *N* = 75, \**p* < .05, \*\**p* < .01, PCL-C = PTSD Checklist – Civilian Version, reexp = reexperiencing, avoid = avoidance, numb = numbing, hyp = hyperarousal, STAI trait = State-Trait Anxiety Inventory, PDEQ = Peritraumatic Dissociative Experiences Questionnaire, TI comp = TI composite variable

Table 4. TI and PTSS: Multiple regression PCL-C numbing scores dependent									
Model	Predictors	M (SD)	в	part <i>r</i>	<i>R</i> <sup>2</sup>	$\Delta R^2$	F	ΔF	
1					.13		10.95**		
	STAI-T	47.66 (11.12)	.36**	.33					
2					.31	.18**	16.09**	18.56**	
	STAI-T		.31**	.31					
	PDEQ	29.09 (10.87)	.43**	.42					
3					.32	.01	10.99**	.85	
	STAI-T		.30**	.29					
	PDEQ		.38**	.33					
	TI	8.38 (5.06)	.11	.09					

*Note*. PCL-C numbing scale descriptive statistics: *M*=11.82, *SD*=5.19 \**p*<.05, \*\**p*<.01.



- The current study was designed to determine whether TI severity would account for variance in PTSS severity over and above the influence of peritraumatic dissociation and trait anxiety.
- Across all analyses TI scores failed to significantly account for variance in PCL-C subscale scores (i.e., reexperiencing, avoidance, numbing, hyperarousal).
- There are several possible reasons we failed to replicate previous findings that have suggested TI is associated with worsened PTSS.
- First, events severe enough to provoke a TI response are likely to be extreme in nature and, thus, inherently more likely to result in worsened posttraumatic symptoms (Zoellner, 2008). Accordingly, reports of TI may function as a proxy indicator of trauma severity.
- Second, the contradictory findings are consistent with previous suggestions that TI and peritraumatic dissociation are interrelated or overlapping constructs. As such, TI may represent a behavioural aspect of extreme peritraumatic dissociation.
- Limitations to this study include reliance on participant's recall for past events. Future research might endeavour to assess individuals for TI and related constructs as near as practical to the time of the event
- Results of this study suggest the TI construct may add little to understanding PTSS beyond what can be ascertained by assessing peritraumatic dissociation and trait anxiety. Given mixed findings to date, further investigation is required to disentangle what is shared and what is distinct among these constructs.

Table 5. TI and PTSS: Multiple regression PCL-C hyperarousal scores dependent									
Model	Predictors	M (SD)	в	part <i>r</i>	<i>R</i> <sup>2</sup>	$\Delta R^2$	F	ΔF	
1					.32		34.35**		
	STAI-T	47.66 (11.12)	.57**	.57					
2					.44	.12**	27.62**	14.47**	
	STAI-T		.53**	.52					
	PDEQ	29.09 (10.87)	.34**	.34					
3					.46	.02	19.91**	2.97	
	STAI-T		.50**	.49					
	PDEQ		.26*	.22					
	ТІ	8.38 (5.06)	.18	.15					

*Note*. PCL-C hyperarousal scale descriptive statistics: *M*=13.24, *SD*=5.02 \**p*<.05, \*\**p*<.01.