Peritraumatic Tonic Immobility and Trauma-Related Symptoms in Adult Survivors of Childhood Sexual Abuse: The Role of Posttrauma Cognitions

Brian R. Van Buren & Mariann R. Weierich

Published online: 23 Dec 2015.

Submit your article to this journal

Article views: 23

View related articles

View Crossmark data

Routledge
Taylor & Francis Group

Peritraumatic Tonic Immobility and Trauma-Related Symptoms in Adult Survivors of Childhood Sexual Abuse: The Role of Posttrauma Cognitions

BRIAN R. VAN BUREN

Hunter College, The City University of New York, New York, New York, USA

MARIANN R. WEIERICH

Hunter College, The City University of New York, New York, New York, USA
The Graduate Center, The City University of New York, New York, New York, USA

Tonic immobility is a set of involuntary motor responses elicited under conditions of extreme fear and perceived inescapability, and it is one type of peritraumatic distress reported by survivors of child sexual abuse. Experiencing tonic immobility during child sexual abuse is associated with increased risk for developing symptoms of post-traumatic stress disorder, although less is known about relations between tonic immobility and other established risk factors for post-traumatic stress disorder. We investigated posttraumatic cognitions as a potential mediator of the relations between peritraumatic fear, perceptions of inescapability, tonic immobility, and post-traumatic stress disorder symptoms. Specifically, we tested posttraumatic negative beliefs about the self, the world, and self-blame as pathways that might increase risk for post-traumatic stress disorder symptoms in child sexual abuse survivors who had experienced tonic immobility. Forty-six women with a history of unwanted childhood sexual contact completed questionnaires measuring peritraumatic tonic immobility, posttraumatic cognitions, and current posttraumatic stress symptoms. Negative beliefs about the self independently mediated the relation between peritraumatic perceptions of inescapability and post-traumatic stress

959

disorder symptoms, but the data did not support similar path model for the physical symptoms of tonic immobility and post-traumatic stress disorder. We discuss ways in which treatment of survivors and future research on CSA can benefit from attention to the impact of peritraumatic distress on posttraumatic beliefs.

KEYWORDS assault, freezing, perceived inescapability, PTSD, self-blame

Child sexual abuse (CSA) is a significant public health concern with a current reported prevalence rate of approximately 10% in the United States (Pérez-Fuentes et al., 2013). Increased risk for adult psychopathology and specifically post-traumatic stress disorder (PTSD) has been well documented in studies of CSA survivors (e.g., Schoedl et al., 2010), with prevalence rates of PTSD shown to be eight times higher in adults who have been exposed to CSA compared to those who have not (Molnar, Buka, & Kessler, 2001). Investigations of the association between CSA exposure and PTSD therefore have largely focused on the identification of additional risk factors for PTSD that might be associated with the immediate and long-term sequelae of CSA. Within this line of research, the role of peritraumatic responses (responses that occur during trauma exposure) has emerged as one such salient risk factor (e.g., Bovin & Marx, 2011). However, as peritraumatic distress itself encompasses a constellation of behavioral, cognitive, and emotional reactions that each are associated with differentially increased risk for PTSD symptoms (e.g., Abrams, Carleton, & Asmundson, 2012; Kunst, Winkel, & Bogaerts, 2011), there is a need for additional investigation into how these reactions might interact with other experiences known to occur in CSA survivors. In particular, the role of post-trauma cognitions in the development and persistence of trauma-related symptoms has been long-recognized by clinicians and recently has been explicitly acknowledged in the most recent diagnostic criteria for PTSD (e.g., Cox, Resnick, & Kilpatrick, 2014). We sought to increase this understanding by testing a model of the relation of peritraumatic distress with subsequent posttraumatic beliefs known to be associated with PTSD symptoms.

During CSA, peritraumatic distress may take the form of tonic immobility (TI), a set of involuntary responses that includes temporary muscular paralysis (resulting in an inability to fight off an attacker or call out for help), lowered body temperature, uncontrollable tremors, and analgesia (Galliano, Noble, Travis, & Puechl, 1993; Suarez & Gallup, 1979). The TI response was initially observed in studies on animals under capture as they demonstrated tremors in their extremities, an unfocused gaze, and unresponsiveness to painful stimuli (Gallup, 1977). The TI response is unlearned and is considered to be the ultimate defense response when other attempts at escape (initial freezing and

subsequent fight or flight responses) have failed. Although the motor inhibition that is characteristic of TI resembles a "freeze" response, TI and "freezing" have been differentiated as distinct phenomena (Bovin & Marx, 2011). When an animal freezes, it engages in an active, purposeful attempt to avoid initial detection by a predator. The freeze response therefore typically occurs *before* the predator has made physical contact. An animal in a state of TI, however, exhibits a passive and involuntary response to having been attacked, and TI can therefore only occur *after* the physical encounter has been made (Gallup, 1977).

Peritraumatic physical restraint, high levels of fear, and perceptions of inescapability are all necessary conditions to induce the physical symptoms of TI (Gallup, Nash, Donegan, & McClure, 1971), and adult survivors of sexual assault have reported experiencing a peritraumatic state of "paralysis" with symptoms that appeared similar to those found in the animal TI state (Suarez & Gallup, 1979). In particular, sexual assault survivors who had experienced motor inhibition during the assault were more likely also to have experienced analgesia, shaking, and lowered body temperature, confirming that TI's constellation of physical symptoms might manifest similarly in humans. Peritraumatic levels of fear and perceptions of inescapability are also associated with the severity of the physical TI response in sexual assault survivors, supporting the conceptualization that the TI response in humans is precipitated by both affective and cognitive peritraumatic experiences (Bovin, Jager-Hyman, Gold, Marx, & Sloan, 2008). In one study, approximately half of CSA survivors reported experiencing symptoms of TI during the abuse (Heidt, Marx, & Forsyth, 2005). In addition, people who reported TI during sexual assault reported greater PTSD symptom severity than those who did not experience TI (Bovin et al., 2008). In pursuing mechanisms to explain this relation, Bovin and colleagues found that the physical symptoms of TI mediated the relations between peritraumatic fear, perceptions of inescapability, and PTSD symptoms. Several studies have also found that TI was the strongest predictor of the reexperiencing symptoms of PTSD, as memory for the assault remains fully intact when TI is elicited (Abrams, Carleton, Taylor, & Asmundson, 2009; Humphreys, Sauder, Martin, & Marx, 2010). This evidence suggests that peritraumatic fear, perceptions of inescapability, and the physical TI response may differentially influence posttraumatic responses and thus implies a need for investigations that consider each of these components individually in terms of their relations to subsequent PTSD symptoms.

Theories of the cognitive components of posttraumatic distress are based primarily on the notion that, following a traumatic event, people need to try to make sense of what they have experienced and often attempt to reconcile the trauma with a prior sense of themselves and their surroundings (e.g., Ehlers & Clark, 2000; Janoff-Bulman, 1989). Foa and Rothbaum (1998) demonstrated the presence and severity of two types of maladaptive beliefs following sexual trauma: (a) negative cognitions about the self, in which the trauma-exposed

person considers himself or herself to be fundamentally incompetent, and (b) negative cognitions about the world, in which the world is judged to be a wholly dangerous place. Investigations of this theory in survivors of sexual trauma have provided evidence that maladaptive posttraumatic beliefs serve as a risk factor for the subsequent development of PTSD symptoms. For example, negative beliefs about the self and the world both were associated with PTSD symptoms in CSA survivors (Cieslak, Benight, & Lehman, 2008), and similar associations have been observed in survivors of adult rape (Foa, Ehlers, Clark, Tolin, & Orsillo, 1999). These findings suggest that the presence and severity of posttraumatic negative self and world beliefs serve as risk factors for PTSD, although additional research into what might promote the development of these beliefs is needed.

Posttraumatic cognitions of self-blame also have been conceptualized as a risk factor for PTSD symptoms, particularly following sexual trauma (e.g., Janoff-Bulman, 1979; Kubany & Manke, 1995). Characterological self-blame was shown to increase risk for overall adult psychological distress in survivors of childhood sexual abuse (Breitenbecher, 2006), and self-blame increased risk for PTSD in sexual assault survivors even after controlling for the effects of other types of depression and other forms of maladjustment (Dunmore, Clark, & Ehlers, 1999). Subscription to self-blaming beliefs following sexual trauma thus appears to be a salient risk factor for PTSD, although the relation between types of self-blame and other posttraumatic cognitions is not yet fully understood.

To date, the potential relation between peritraumatic risk factors such as TI and posttrauma risk factors such as negative cognitions and self-blame has not been examined. In addition, despite a known link between cognitive perceptions of inescapability and the TI response, less attention has been given to the potential influence of the cognitive components of peritraumatic stress on posttraumatic cognitions. Given the distressing physical, affective, and cognitive elements of the TI response (e.g., muscular paralysis, uncontrollable shaking, an inability to scream for help, intense fear, and perceptions of inescapability), it is likely that a survivor's experience and recollection of TI might influence the development of cognitions that are associated with increased risk for PTSD.

The broad objective of the current study is to integrate and expand on the prior research on the roles of TI and posttraumatic cognitions as risk factors for PTSD following exposure to CSA. We investigated the potential relations between the peritraumatic response of tonic immobility and posttraumatic cognitions, with specific attention to not only physical symptoms of TI but also its affective (fear) and cognitive (perceptions of inescapability) components (see Figure 1).

Specifically, we tested a theoretical model in which we posited posttraumatic cognitions as a mechanism through which TI and peritraumatic cognitions might increase risk for PTSD following CSA. We hypothesized
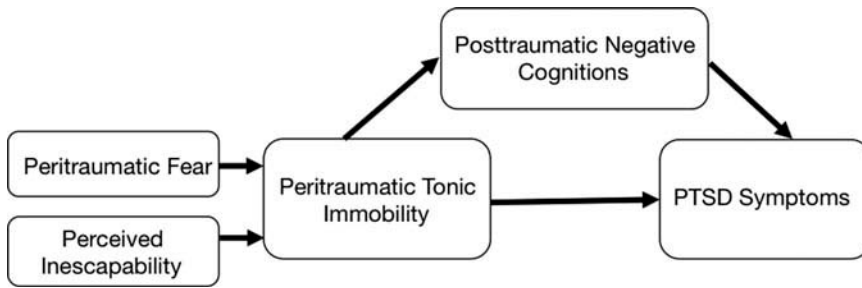
FIGURE 1 The proposed relation between the affective and cognitive precursors of tonic immobility, the experience of tonic immobility, posttraumatic negative cognitions, and later PTSD symptoms.

that negative beliefs about the self and self-blame would each independently mediate the relation between the physical and cognitive components of the TI response and PTSD symptom severity in a sample of female CSA survivors.

METHOD

Participants

Forty-six women (ages 18–37, $M = 22.11$, $SD = 5.32$) with a history of unwanted sexual contact prior to the age of 18 were recruited from a large urban university that enrolls a large percentage of students of nontraditional age and experience. The self-reported racial composition of the sample was 48.1% Caucasian, 18.5% African descent, 18.5% Asian, 7.4% Hispanic, and 7.4% self-reported "other race." In addition, we followed the guidelines of Fritz and MacKinnon (2007) to estimate the sample size necessary for .8 power to detect a moderate alpha (direct) path and a moderate beta (mediated) path. Per these guidelines, a sample size of 34 is sufficient to detect moderate effects for either path, and we oversampled to account for the possibility of a slightly weaker alpha or beta path effect.

All potential participants completed an online checklist of exposure to sexual assault or any other form of unwanted sexual contact. Participants responded by endorsing one or more forms of potential exposure to these events: "happened to me," "witnessed it," "learned about it," "not sure," or "does not apply to me." Prescreen participants also had the option of declining to answer any question. Only participants who endorsed the "happened to me" response on either of the two questions pertaining to unwanted sexual contact were eligible to participate in the study. We invited eligible potential participants via e-mail to sign up via a secure site that included general information about the nature of the study.

Materials and Procedure

We used three self-report questionnaires to measure TI during the most recent experience of CSA, posttraumatic cognitions specific to the experience of childhood sexual abuse, and current PTSD symptoms indexed where relevant (e.g., reexperiencing) to the experience of CSA.

TONIC IMMOBILITY

Participants completed the Tonic Immobility Scale–Child Form (TIS-C; Forsyth, Marx, Heidt, Fusé, & Gallup, 2000), a 14-item questionnaire that assesses the presence and severity of the physical symptoms of TI, peritraumatic fear, and perceived inescapability. Respondents report on the most recent experience of unwanted sexual contact that occurred prior to the age of 18. Each item addresses a specific aspect of TI, and respondents rate the extent to which they experienced each symptom on a scale ranging from 0 (e.g., "could scream for help freely") to 6 (e.g., "could not scream for help at all"). Factor analyses have shown that the items yield two independent factors: physical TI symptoms (7 items) and peritraumatic fear (3 items; Fusé, Forsyth, Marx, Gallup, & Weaver, 2007). Internal consistency on both factors was strong (α = .94 and .90 for the TI symptoms and peritraumatic fear factors, respectively; Fusé et al., 2007). Three additional items on the TIS-C do not load on either factor. These items assess two symptoms of dissociation: depersonalization and derealization (whether respondents felt detached from themselves or their surroundings), and the third item assesses whether respondents experienced feelings of guilt or shame immediately following the abuse. An additional item on the TIS-C assesses the contribution of perceived inescapability to the sequelae of TI by asking respondents to rate the extent to which they felt that they could escape during the assault. Studies using the TIS-C with survivors of CSA (e.g., Heidt et al., 2005) have supported the validity of the questionnaire as a valid measure of the TI response and its correlates.

POSTTRAUMATIC COGNITIONS

We assessed negative posttraumatic cognitions with the Posttraumatic Cognitions Inventory (PTCI; Foa et al., 1999), a 36-item questionnaire that assesses the presence and strength of cognitions related to a specified traumatic event (in this case, CSA). Items assess the extent to which participants endorse cognitions about their most recent experience of CSA on three independent subscales: negative cognitions about the self (e.g., "I am a weak person"), negative cognitions about the world (e.g., "People can't be trusted"), and self-blame (e.g., "This event happened because of the way I acted"). Participants rate their endorsement of items on a Likert scale ranging from 1 ("totally disagree") to 7 ("totally agree").

Responses to items within each subscale are averaged to create a score ranging from 1 to 7, and an overall score of posttraumatic cognitions is determined by computing the sum of the subscale scores. The PTCI has demonstrated strong internal consistency on each of the subscales (negative cognitions about the self, $\alpha = .97$; negative cognitions about the world, $\alpha = .88$; and self-blame, $\alpha = .86$) and on the total score ($\alpha = .97$; Foa et al., 1999).

PTSD SYMPTOMS

We assessed PTSD symptoms using the Posttraumatic Diagnostic Scale (PDS; Foa, Cashman, Jaycox, & Perry, 1997). The PDS is a 49-item questionnaire that assesses history of traumatic events and the presence and severity of PTSD symptoms according to established diagnostic criteria. Respondents are first provided with a list of traumatic events and asked to indicate which of those events they have experienced. Participants are then asked to indicate which traumatic event they found the most upsetting. Participants then rate the frequency with which they have experienced each of the 17 *Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition (DSM-IV) PTSD symptoms during the past month, in relation to the index event, on a Likert scale ranging from 0 ("not at all/only one time") to 3 ("five or more times a week/almost always"). The symptom items are clustered into the three DSM-IV PTSD subscales: reexperiencing symptoms (5 items), avoidance/numbing symptoms (7 items), and hyperarousal symptoms (5 items). Overall PTSD symptom severity scores range from 0 to 51; scores for reexperiencing symptoms and hyperarousal symptom clusters each range from 0 to 15; and scores for the avoidance/numbing symptom cluster range from 0 to 21. The PDS thus permits dimensional investigations of PTSD symptoms, which is consistent with our goal of examining relations between peritraumatic experiences and the severity of posttraumatic stress symptoms, independent of diagnostic status.

Study participants completed all procedures individually in a private room. Following consent, participants first completed a brief demographics form, followed by the TIS-C, PTCI, and PDS. The order of the questionnaires was the same for all participants. A standard lab safety protocol was in place in the event of participant distress, and all participants were informed of their option to discontinue participation at any time. No participants experienced undue distress, and all participants completed the protocol. Participants were compensated with study participation credit for an undergraduate psychology course. All study procedures were approved by the institutional review board, and informed consent was obtained from all participants.

RESULTS

Descriptive Data and Bivariate Correlations

TIS-C, PTCI, and PDS scores are presented in Table 1.

    Consistent with reports on the prescreening measure, for the PDS all participants endorsed at least one type of childhood sexual abuse: sexual assault by a family member or aquaintance (40%), sexual assault by a stranger (27%), or other unwanted sexual contact such as genital contact during childhood (69%). One participant endorsed all three exposure types, 13 participants endorsed two, and 32 participants endorsed one. The mean scores on each of the questionnaire measures indicate that our sample endorsed low to moderate symptoms of TI, posttraumatic cognitions, and PTSD symptoms. Specifically, according to Sheeran and Zimmerman's (2002) clinical cutoff score of 27 on the PDS, only one participant fully met criteria for a DSM-IV diagnosis of PTSD, and the range of scores for overall PTSD symptom severity was 0–31 (M = 12.26, SD = 8.37). Given the aim of examining posttraumatic stress symptoms dimensionally rather than PTSD diagnoses categorically, all participants were included in our analyses. Raw scores for negative posttraumatic cognitions about the self were positively skewed, and we used a logarithmic transformation to achieve normality for this variable for the purposes of subsequent analyses.

    As a first analytic step we conducted bivariate correlations among all variables of interest (see Table 2).

    Perceived inescapability was positively associated with negative cognitions about the self, negative cognitions about the world, avoidance/numbing symptoms, and overall PTSD symptom severity. Neither physical symptoms of TI nor

TABLE 1 Reported TI Symptoms, Posttraumatic Cognitions, and PTSD Symptoms

Variable	*M*	*SD*	Range of Sample	Possible Range of Measure
TI	18.26	6.20	8–31	0–42
Fear	6.70	3.11	1–14	0–18
PI	3.04	2.05	0–6	0–6
PTCI Total	9.97	3.06	4.24–18.95	1–21
Negative Self	2.21	1.05	1.00–5.24	1–7
Negative World	4.57	1.25	2.00–6.71	1–7
Self-Blame	3.19	1.76	1.00–7.00	1–7
PDS Total	12.26	8.37	0–31	0–51
Reexperiencing	3.00	2.76	0–10	0–15
Avoidance	4.63	4.49	0–16	0–21
Hyperarousal	4.63	2.79	0–10	0–15

Note. TI = physical tonic immobility symptoms; PI = perceived inescapability; PTCI total = total Posttraumatic Cognitions Inventory score; negative self = negative cognitions about the self; negative world = negative cognitions about the world; PDS total = total Posttraumatic Diagnostic Scale severity score.

TABLE 2 Correlations Among Tonic Immobility, Posttraumatic Cognitions, and PTSD Symptoms

Variable	1	2	3	4	5	6	7	8	9	10	11
1. TI											
2. Fear	−.13										
3. PI	**.57****	.05									
4. PTCI Total	.08	.22	**.45***								
5. Negative Self	.19	.07	**.45***	*.76***							
6. Negative World	.07	.09	**.48***	*.66***	**.50****						
7. Self-blame	−.02	.27	.19	*.78***	**.39***	.12					
8. PDS Total	.13	**.38***	**.42***	**.57****	**.63****	**.39***	.33				
9. Reexperiencing	.18	.30	.31	**.44***	**.40***	.34	.28	*.82***			
10. Avoidance	.12	.25	**.46***	**.48***	**.59****	.25	.28	*.91***	**.65****		
11. Hyperarousal	.02	**.45***	.23	**.50****	**.55****	**.44***	.26	*.73***	**.43***	**.47***	

Note. TI = physical tonic immobility symptoms; PI = perceived inescapability; PTCI total = total Posttraumatic Cognitions Inventory score; negative self = negative cognitions about the self; negative world = negative cognitions about the world; PDS total = total Posttraumatic Diagnostic Scale severity score. Correlations for negative cognitions about the self are based on a logarithmic transformation of this variable to achieve normality. Italicized correlations designate significant associations between the total score of a measure and the subscales it comprises, indicating multicollinearity. Correlations in boldface designate significant associations between distinct variables.* $p < .05$. ** $p < .01$.

peritraumatic fear were significantly associated with any posttraumatic cognitions or any PTSD symptom cluster scores. In addition, neither symptoms of depersonalization nor derealization were associated with perceived inescapability. Negative cognitions about the self were associated with all PTSD symptom clusters and overall symptom severity. Thus, although a significant relation between the physical symptoms of TI and PTSD symptoms did not emerge, there was evidence for the role of peritraumatic perceptions of inescapability as a potential risk factor for PTSD symptoms within this sample.

Mediation Analysis

As a second analytic step, we conducted mediation analyses consistent with our hypotheses and the relations observed in the bivariate correlations. Perceived inescapability (the cognitive component of the TI response) was associated with both negative cognitions about the self and overall PTSD symptom severity. Based on this association and on the temporal relation between peritraumatic distress, posttraumatic cognitions, and subsequent adult PTSD symptoms, we tested whether negative cognitions about the self mediated the relation between perceived inescapability and PTSD symptom severity.

To test mediation, we used a bootstrapping method with 10,000 resamples (Preacher & Hayes, 2008) to test the indirect effect of peritraumatic perceived inescapability during CSA on current (adult) PTSD symptom severity through the potential mediator of posttraumatic negative cognitions about

TABLE 3 Bootstrapping Analysis of Indirect Effects

	Bootstrapping		95% CI	
	Estimate	SE	Lower	Upper
Total Effect: x → y				
PI → Symptom Severity	1.510	.626	.2478	2.772
Indirect Effect: x → m → y				
PI → Neg. Cog. Self → Symptom Severity	1.087	.426	.3417	2.028

Note. Bootstrapping analysis with 10,000 resamples. Coefficients are unstandardized. "x" = independent variable, "y" = dependent variable, "m" = mediating variable. PI = perceived inescapability. Neg. cog. self = posttraumatic negative cognitions about the self. Symptom severity = PTSD symptom severity on the PDS.

the self. This nonparametric method generates estimates of the indirect effect within a 95% confidence interval (CI) (see Table 3).

In our analysis, the indirect effect of negative cognitions about the self was estimated to lie between a bootstrapped lower limit of .3417 and an upper limit of 2.0280. Because zero does not lie within this 95% CI, we can conclude that the indirect effect is significantly different from zero at $p < .05$ and that the effect of the independent variable (perceptions of inescapability) on the dependent variable (PTSD symptom severity) is mediated by our proposed mediator (negative cognitions about the self).

DISCUSSION

We tested posttraumatic beliefs about the self, the world, and self-blame as potential mediators of the relation between the peritraumatic response of tonic immobility and PTSD symptom severity in a sample of adults who had experienced CSA. Consistent with some prior work (e.g., Bovin et al., 2008), perceived inescapability, the cognitive component of the TI response, predicted PTSD symptoms. This finding supports the association between certain forms of peritraumatic distress and the subsequent development of PTSD symptoms. In addition, our mediation analysis revealed that negative posttraumatic cognitions about the self fully mediated the relation between perceived inescapability and PTSD. This suggests that it might be *through* these negative cognitions that perceived inescapability is associated with PTSD symptom severity and that the experience of both peritraumatic perceived inescapability and posttraumatic negative cognitions might constitute a uniquely increased risk for the development of PTSD symptoms. The physical symptoms of TI were not associated with PTSD symptoms in our sample. This is a surprising finding in light of both theoretical (e.g., Marx, Forsyth, Gallup, Fusé, & Lexington, 2008) and empirical (Heidt et al., 2005) investigations of

the TI response that have demonstrated TI as a risk factor for PTSD following CSA. However, to our knowledge, ours is the first study to examine mediating factors that influence the relations between each of the distinct components of the TI response and subsequent PTSD symptoms. Our finding that perceptions of inescapability were associated with posttraumatic cognitions implies that the cognitive distress experienced during an overwhelming encounter such as CSA might in fact be one of the most salient components of the peritraumatic stress response and might be most likely to influence the posttraumatic appraisals that are robustly associated with subsequent PTSD symptoms. Notably, neither the dissociative experiences of depersonalization nor derealization were associated with perceived inescapability. As peritraumatic dissociation is considered to be a cognitive phenomenon (e.g., Bovin & Marx, 2011), this finding lends increasing support to the notion that perceived inescapability and dissociation are distinct forms of peritraumatic cognitive responses.

The posttraumatic cognition of self-blame was not associated with TI symptoms or with PTSD symptoms in our sample. This finding is inconsistent with some prior studies that have shown associations between characterological self-blame (e.g., Dunmore et al., 1999), the related construct of guilt (e.g., Bovin et al., 2014), and PTSD. The discrepant finding in our study may be attributable to the fact that the self-blame subscale of the PTCI does not discriminate between behavioral and characterological self-blame (Startup, Makgekgenene, & Webster, 2007). Items on this subscale inquire about beliefs that appear to correspond with both behavioral (e.g., "This event happened because of the way I acted") and characterological (e.g., "There is something about me that made the event happen") self-blame. In addition, some items appear to assess both types of self-blame within one statement (e.g., "Somebody else would have stopped the event from happening"). The difficulty in differentiating each of these types of self-blame within the PTCI presents a challenge for interpreting our results on this construct and might explain the absence of associations between self-blame and PTSD.

This study provides support for an important and treatment-relevant relation between peritraumatic distress (perceived inescapability), posttraumatic cognitions, and PTSD symptoms in survivors of CSA, although our analyses were based on a relatively small sample size that might not be representative of all CSA survivors. In addition, the TIS-C asks respondents to report on their most recent experience of CSA but does not assess the frequency or duration of CSA exposure or the age of the most recent experience of CSA. We were therefore unable to account for the potentially differing or confounding effects of chronic exposure to CSA or age of victimization. However, the temporal clarity provided by our mediation model implies that symptoms of PTSD were influenced by the posttraumatic cognitions about CSA that developed as a result of cognitive perceptions of inescapability experienced during trauma exposure. Our sample also reported a low to

moderate range of current PTSD symptoms, and our results might not generalize to survivors who have higher levels of distress and symptoms. Furthermore, there is always a risk of inaccuracies in retrospective reports of events; participants might have had a difficult time accurately remembering their peritraumatic reactions, particularly for events that occurred in childhood. We also did not collect information from participants about treatments that they might have received following CSA exposure or the onset of PTSD symptoms. Prior or current psychotherapy or other clinical interventions might have an effect on the posttraumatic cognitions that put survivors of CSA at risk for PTSD symptoms, and we were unable to control for this potential confound. Finally, our measurement strategy did not allow the detail regarding the trauma exposure that would be gained from a detailed clinical interview, therefore future work will be necessary to confirm that the experiences of our sample are comparable to the experiences of survivors who experience higher levels of distress. Given we examined PTSD symptoms dimensionally and did not recruit a clinical sample, some of our hypothesized mediating paths might be observed in CSA survivors with higher levels of current symptoms. On the other hand, the mediating role of posttraumatic cognitions might be considered all the more robust given it was observed in a sample with lower symptom severity.

Our study expands on prior work by examining associations between peri- and posttraumatic risk factors for PTSD symptoms following exposure to CSA. Our data provide preliminary support for the role of negative posttraumatic self-appraisals as a mechanism through which peritraumatic perceptions of inescapability lead to PTSD symptoms. This relation introduces the potential clinical utility of assessing CSA survivors for retrospective accounts of perceived inescapability. Survivors of CSA who recall having perceived that they could not escape the attack might be more likely to endorse the negative self-appraisals that are associated with increased risk for PTSD symptoms. Assessing perceptions of inescapability might therefore help in planning appropriate treatments that are aimed at changing negative posttraumatic beliefs in order to decrease or prevent PTSD symptoms. We also focused on female survivors in this study, although peritraumatic TI is not gender-specific. In fact, male survivors might be at heightened risk for negative cognitions and anger toward the self following sexual assault (e.g., Galovski, Blain, Chappuis, & Fletcher, 2013) and might in particular misinterpret the TI response as personal weakness. Additional research on other forms of cognitive peritraumatic distress such as dissociation has been largely inconclusive regarding the effects of dissociation on PTSD symptoms (e.g., Dalenberg et al., 2012; Otis, Marchand, & Courtois, 2012), and our findings indicate that dissociation and other cognitive components of peritraumatic distress such as perceived inescapability are distinct phenomena. In light of our finding of the mediating role of posttraumatic cognitions, future investigations of CSA survivors who have experienced both perceived inescapability and dissociation could further

explicate the differential pathways to PTSD symptoms following these two forms of peritraumatic cognitive responses. Our findings also outline areas for future research on CSA. For example, our results suggest that peritraumatic perceptions of inescapability are a potentially salient aspect of exposure to CSA, but little is known about why some survivors experience this perception more severely than others. Additional research in this area might reveal contextual characteristics of CSA that moderate levels of perceived inescapability, such as the setting of the abuse, the presence of other people during or immediately preceding exposure, or the survivor's relationship to the perpetrator. Continued investigations of peri- and posttraumatic responses in survivors of CSA will facilitate a deeper understanding of how to minimize the risk of adult psychopathology in those who have been exposed to this form of child maltreatment.

FUNDING

REFERENCES

Abrams, M. P., Carleton, N. R., & Asmundson, G. J. G. (2012). Tonic immobility does not uniquely predict posttraumatic stress symptom severity. *Psychological Trauma: Theory, Research, Practice, and Policy*, *4*(3), 278–284. doi:10.1037/a0023272

Abrams, M. P., Carleton, R. N., Taylor, S., & Asmundson, G. J. G. (2009). Human tonic immobility: Measurement and correlates. *Depression and Anxiety*, *26*, 550–556. doi:10.1002/da.20462

Bovin, M. J., Dodson, T. S., Smith, B. N., Gregor, K., Marx, B. P., & Pineles, S. L. (2014). Does guilt mediate the association between tonic immobility and posttraumatic stress disorder symptoms in female trauma survivors? *Journal of Traumatic Stress*, *27*, 721–724. doi:10.1002/jts.21963

Bovin, M. J., Jager-Hyman, S., Gold, S. D., Marx, B. P., & Sloan, D. M. (2008). Tonic immobility mediates the influence of peritraumatic fear and perceived inescapability on posttraumatic stress symptom severity among sexual assault survivors. *Journal of Traumatic Stress*, *21*(4), 402–409. doi:10.1002/jts.20354

Bovin, M. J., & Marx, B. P. (2011). The importance of the peritraumatic experience in defining traumatic stress. *Psychological Bulletin*, *137*(1), 47–67. doi:10.1037/a0021353

Breitenbecher, K. H. (2006). The relationships among self-blame, psychological distress, and sexual victimization. *Journal of Interpersonal Violence*, *21*(5), 597–611. doi:10.1177/0886260506286842

Cieslak, R., Benight, C. C., & Lehman, V. C. (2008). Coping self-efficacy mediates the effects of negative cognitions on posttraumatic distress. *Behaviour Research and Therapy*, *46*, 788–798. doi:10.1016/j.brat.2008.03.007

Cox, K. S., Resnick, H. S., & Kilpatrick, D. G. (2014). Prevalence and correlates of posttrauma distorted beliefs: Evaluating DSM-5 PTSD expanded cognitive symptoms in a national sample. *Journal of Traumatic Stress*, *27*, 299–306. doi:10.1002/jts.21925

Dalenberg, C. J., Brand, B. L., Gleaves, D. H., Dorahy, M. J., Loewenstein, R. J., Cardeña, E. … Spiegel, D. (2012). Evaluation of the evidence for the trauma and fantasy models of dissociation. *Psychological Bulletin*, *138*(3), 550–588. doi:10.1037/a0027447

Dunmore, E., Clark, D. M., & Ehlers, A. (1999). Cognitive factors involved in the onset and maintenance of posttraumatic stress disorder (PTSD) after physical or sexual assault. *Behaviour Research and Therapy*, *37*(9), 809–829. doi:10.1016/S0005-7967(98)00181-8

Ehlers, A., & Clark, D. M. (2000). A cognitive model of posttraumatic stress disorder. *Behaviour Research and Therapy*, *38*, 319–345. doi:10.1016/S0005-7967(99)00123-0

Foa, E. B., Cashman, L., Jaycox, L., & Perry, K. (1997). The validation of a self-report measure of posttraumatic stress disorder: The posttraumatic diagnostic scale. *Psychological Assessment*, *9*(4), 445–451. doi:10.1037/1040-3590.9.4.445

Foa, E. B., Ehlers, A., Clark, D. M., Tolin, D. F., & Orsillo, S. M. (1999). The posttraumatic cognitions inventory (PTCI): Development and validation. *Psychological Assessment*, *11*(3), 303–314. doi:10.1037/1040-3590.11.3.303

Foa, E. B., & Rothbaum, B. O. (1998). *Treating the trauma of rape: Cognitive–behavioral therapy for PTSD*. New York, New York: Guilford.

Forsyth, J. P., Marx, B., Heidt, J., Fusé, T. M. K., & Gallup, G. G., Jr. (2000). *The Tonic Immobility Scale—Child Form*. Albany, NY: Authors.

Fritz, M. S., & MacKinnon, D. P. (2007). Required sample size to detect the mediated effect. *Psychological Science*, *18*, 233–239. doi:10.1111/j.1467-9280.2007.01882.x

Fusé, T., Forsyth, J. P., Marx, B., Gallup, G. G., Jr., & Weaver, S. (2007). Factor structure of the Tonic Immobility Scale in female sexual assault survivors: An exploratory and confirmatory factor analysis. *Journal of Anxiety Disorders*, *21*, 265–283. doi:10.1016/j.janxdis.2006.05.004

Galliano, G., Noble, L. M., Travis, L. A., & Puechl, C. (1993). Victim reactions during rape/sexual assault: A preliminary study of the immobility response and its correlates. *Journal of Interpersonal Violence*, *8*, 109–114. doi:10.1177/088626093008001008

Gallup, G. G., Jr. (1977). Tonic immobility: The role of fear and predation. *Psychological Record*, *27*, 41–61.

Gallup, G. G., Jr., Nash, R. F., Donegan, N. H., & McClure, M. K. (1971). The immobility response: A predator-induced reaction in chickens. *The Psychological Record*, *21*(4), 513–519.

Galovski, T. E., Blain, L. M., Chappuis, C., & Fletcher, T. (2013). Sex differences in recovery from PTSD in male and female interpersonal assault survivors. *Behaviour Research and Therapy*, *51*, 247–255. doi:10.1016/j.brat.2013.02.002.

Heidt, J. M., Marx, B. P., & Forsyth, J. P. (2005). Tonic immobility and childhood sexual abuse: A preliminary report evaluating the sequela of rape-induced paralysis. *Behaviour Research and Therapy*, *43*, 1157–1171. doi:10.1016/j.brat.2004.08.005

Humphreys, K. L., Sauder, C. L., Martin, E. K., & Marx, B. P. (2010). Tonic immobility in childhood sexual abuse survivors and its relationship to posttraumatic stress symptomatology. *Journal of Interpersonal Violence*, *25*(2), 358–373. doi:10.1177/0886260509334412

Janoff-Bulman, R. (1979). Characterological versus behavioral self-blame: Inquiries into depression and rape. *Journal of Personality and Social Psychology*, *37*(10), 1798–1809. doi:10.1037/0022-3514.37.10.1798

Janoff-Bulman, R. (1989). Assumptive worlds and the stress of traumatic events: Applications of the schema construct. *Social Cognition*, *7*(2), 113–136. doi:10.1521/soco.1989.7.2.113

Kubany, E. S., & Manke, F. P. (1995). Cognitive therapy for trauma-related guilt: Conceptual bases and treatment outlines. *Cognitive and Behavioral Practice*, *2*, 27–61. doi:10.1016/S1077-7229(05)80004-5

Kunst, M., Winkel, F. W., & Bogaerts, S. (2011). Recalled peritraumatic reactions, self-reported PTSD, and the impact of malingering and fantasy proneness in victims of interpersonal violence who have applied for state compensation. *Journal of Interpersonal Violence*, *26*, 2186–2210. doi:10.1177/0886260510383032

Marx, B. P., Forsyth, J. P., Gallup, G. G., Jr., Fusé, T., & Lexington, J. M. (2008). Tonic immobility as an evolved predator defense: Implications for sexual assault survivors. *Clinical Psychology: Science and Practice*, *15*(1), 74–90. doi:10.1111/j.1468-2850.2008.00112.x

Molnar, B. E., Buka, S. L., & Kessler, R. C. (2001). Child sexual abuse and subsequent psychopathology: Results from the national comorbidity survey. *American Journal of Public Health*, *91*(5), 753–760. doi:10.2105/AJPH.91.5.753

Otis, C., Marchand, A., & Courtois, F. (2012). Peritraumatic dissociation as a mediator of peritraumatic distress and PTSD: A retrospective, cross-sectional study. *Journal of Trauma & Dissociation*, *13*(4), 469–477. doi:10.1080/15299732.2012.670870

Pérez-Fuentes, G., Olfson, M., Villegas, L., Morcillo, C., Wang, S., & Blanco, C. (2013). Prevalence and correlates of child sexual abuse: A national study. *Comprehensive Psychiatry*, *54*, 16–27. doi:10.1016/j.comppsych.2012.05.010

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, *40*, 879–891. doi:10.3758/BRM.40.3.879

Schoedl, A. F., Costa, M. C. P., Mari, J., Mello, M. F., Tyrka, A. R., Carpenter, L. L., & Price, L. H. (2010). The clinical correlates of reported childhood sexual abuse: An association between age at trauma onset and severity of depression and PTSD in adults. *Journal of Child Sexual Abuse*, *19*, 156–170. doi:10.1080/10538711003615038

Sheeran, T., & Zimmerman, M. (2002). Screening for posttraumatic stress disorder in a generalpsychiatric outpatient setting. *Journal of Consulting and Clinical Psychology*, *70*, 961–966. doi:10.1037/0022-006X.70.4.961

Startup, M., Makgekgenene, L., & Webster, R. (2007). The role of self-blame for trauma as assessed by the Posttraumatic Cognitions Inventory (PTCI): A self-

protective cognition? *Behaviour Research and Therapy*, *45*, 395–403. doi:10.1016/j.brat.2006.02.003

Suarez, S. D., & Gallup, G. G., Jr. (1979). Tonic immobility as a response to rape: A theoretical note. *Psychological Record*, *29*, 315–320.

AUTHOR NOTES

Brian Van Buren, MA, is a doctoral student in clinical psychology in the Department of Psychology at Long Island University. His research interests include the effects of trauma on interpersonal functioning and personality. He received his MA from Hunter College CUNY.

Mariann Weierich, PhD, is an assistant professor in the Department of Psychology at Hunter College CUNY and a member of the doctoral faculty of the Graduate Center of the City University of New York. Her current research interests focus on the neural and behavioral mechanisms of stress and stress-related disorders. She received her PhD from Yale University.