Published in final edited form as:

Clin Psychol (New York). 2008 March 1; 15(1): 98–101. doi:10.1111/j.1468-2850.2008.00114.x.

Translational Challenges With Tonic Immobility

Lori A. Zoellner

University of Washington

Abstract

Drawing heavily from the nonhuman animal literature, understanding of tonic immobility (TI), a sustained and involuntary physical immobility, may yield clear clinical implications and strong future translational research. Clinically, for individuals who potentially have experienced TI, psychoeducation regarding its involuntary and defensive nature may help normalize trauma-related reactions. This must be balanced with the reactive nature of the information and the recognition of potentially more common survival strategies. The application of TI for research purposes may pose translational obstacles regarding construct definition and assessment. Issues include separating the construct from non-TI-related event or perpetrator characteristics, peritraumatic dissociation, and event severity. Furthermore, with its assessment, clinical status and time may inflate endorsement of the presence or severity of TI reactions.

Keywords

PTSD; tonic immobility; trauma exposure

Starting, and looking half round, I saw the lion just in the act of springing on me. I was on a little height; he caught my shoulder as he sprang, and we both came to the ground below together. Growling horribly close to my ear, he shook me as a terrier dog does a rat. The shock produced a stupor similar to that which seems to be felt by a mouse after the first shake of the cat. It caused a sort of dreaminess, in which there was neither sense of pain nor feeling of terror, although quite conscious of all that was happening. It was like what patients partially under the influence of chloroform describe, who see all the operation, but feel not the knife. This singular condition was not the result of any mental process. The shake annihilated fear, and allowed no sense of horror in looking round at the beast. This peculiar state is probably produced in all animals killed by the carnivora; and if so, it is a merciful provision by our benevolent Creator for lessening the pain of death. (Livingstone, 1857)

This striking quote is by David Livingstone, a Scottish missionary and explorer, on an encounter with a lion in the valley of Mabotsa. Although experimentally well documented in nonhuman species, anecdotal and case report quotes such as this provide the bulk of evidence for a sustained and involuntary pattern of physical immobility known as tonic immobility (TI) in humans. As suggested by Marx, Forsyth, Gallup, Fusé, and Lexington (2008), the extension of the TI construct to humans holds the potential for clear clinical and scientific benefits for survivors of traumatic events; yet, considerable work is still needed in

translating this construct from the nonhuman animal literature to the human one for research purposes.

CLINICAL BENEFITS OF THE TI CONSTRUCT

One of the biggest potential benefits for the expansion of the use of the TI construct in humans is to help normalize reactions during the traumatic event in its immediate aftermath. Although debate exists regarding the best, if any, psychosocial or pharmacological intervention immediately following trauma exposure to prevent the development of chronic posttraumatic stress disorder (PTSD; e.g., Herbert & Sageman, 2004), most experts recommend general psychoeducation regarding common reactions during and after trauma exposure. Psychoeducation is also a common component in the treatment of chronic PTSD (e.g., Foa & Rothbaum, 1998). The addition of a TI component to this psychoeducation, where appropriate event-related characteristics occurred, may, in particular, help prevent or address potential detrimental, cognitive shifts regarding the meaning of the event to oneself that often occur as a result of trauma exposure (Ehlers & Clark, 2000). Specifically, this discussion may do well to address the unlearned, reactionary nature of the TI response, highlighting both the general inability to move regardless of the opportunity to do so and its analgesic properties. Indeed, as Marx et al. (2008) suggest, the discussion of TI may help mitigate feelings of self-blame or guilt for not having done more to escape or limit an attack. However, the relationship among TI, self-blame or guilt, and subsequent PTSD symptoms is an empirical question awaiting further validation and replication; a recent presentation suggested a lack of mediation of self-blame between TI and PTSD symptoms (Bovin, Pontoski, Marx, Sloan, & Forsyth, 2007).

The addition of a TI component to typical psychoeducation procedures following trauma exposure, however, may be a double-edge sword. First, individuals may actually come to fear the TI response in future attacks, contributing to their sense of uncontrollability and unpredictability of their own reactions. Here, highlighting that TI is conceptualized as occurring after more active defense postures such as fight or flight and after unsuccessful escape or resistance have occurred may help alleviate this fear. Second, an overreliance on the TI construct may inadvertently shift the focus away from a potentially more common, more volitional survival strategy, namely acquiescence in the face of an inescapable situation. This survival strategy is well expressed by Alice Sebold (1999, pp. 6–7) in *Lucky*, where she describes doing what is needed to survive a life-threatening situation:

People think a woman stops fighting when she is physically exhausted, but I was about to begin my real fight, a fight of words and lies and the brain . . . He held my life in his hands. Those who say they would rather fight to the death than be raped are fools. I would rather be raped a thousand times. You do what you have to do.

Ultimately, an overreliance on the TI construct may further accentuate blame of the victim, both by herself and by society, who reacted with a survival-based acquiescence response, but not a TI response, for physically being able to act but not doing so. Each survival strategy, one more volitional and the other less volitional, needs to be equally validated and understood.

CHALLENGES OF TRANSLATING THE TI CONSTRUCT FOR RESEARCH PURPOSES

As well pointed out by Marx et al. (2008), the translation of the TI construct from the nonhuman animal experimental literature to humans poses a number of challenges, largely due to the interplay of cognitive and linguistic domains. This includes both the definition of the construct and its assessment.

Construct Definition

One of the strengths of the current conceptualization of TI is its general reliance on behavioral markers of the construct (e.g., inability to move though not restrained, inability to call out or scream, analgesia) rather than more subjective markers (e.g., feelings of numbness, detachment from self). Nevertheless, even with a general reliance on more behavioral markers, the high rates of TI reported in recent investigations (e.g., 52%, Heidt, Marx, & Forsyth, 2005; 41.5%, 41.7%, Fusé, Forsyth, Marx, Gallup, & Weaver, in press) may reflect a failure to account for event- and perpetrator-related characteristics that may result in false positives for TI-related experiences. For example, an individual may have been unable to move though not restrained, not because of a motor inability, but simply due to the presence of a weapon or the size/power of the attacker to stop any such movement. Similarly, an individual may have been unable to call out or scream during the event, not because of tonic immobility, but because he or she was gagged or due to some perceived threat if he or she did. Thus, a TI-related response that renders an individual unable to perform a motoric activity is clearly different from contextual factors that prevent motoric activity, though physically possible. This level of fine-grained analysis is needed to separate TI from non-TI-related behavioral responses.

The inclusion of more subjective markers of TI that are also considered symptoms of peritraumatic dissociation (e.g., numbness, detachment from self) raises the issue of conceptual overlap of these constructs. Indeed, Marx et al. (2008) reported an association between TI and dissociation (Fusé et al., in press; Heidt et al., 2005); however, it remains unclear what are shared and what are distinct subjective markers of each construct. Although both are believed to be a result of extreme fear, the cognitive processing potentially associated with TI and peritraumatic dissociation appear at odds, if not diametrically opposed; TI is thought to be associated with a lack of disruption in, perhaps even enhanced, event-related memory, consciousness, and learning (e.g., Gallup, Boren, Suarez, Wallnau, & Gagliardi, 1980), whereas peritraumatic dissociation is thought to impair or disrupt these processes (e.g., Spiegel, 1995). Even taking into account individual difference factors such as prior trauma history and genetic vulnerability, it seems unlikely that similar conditions would produce similar subjective responses that would yield diverging effects on information processing. Clearly, both the convergent and discriminant validity of TI and peritraumatic dissociation and their impact on information processing need further exploration.

Finally, when examining the utility of the TI construct for the prediction of subsequent psychopathology, TI is inherently intertwined with event severity. Given that extreme fear, physical contact, and the perception of inescapability are potentially necessary conditions affecting the susceptibility to and duration of TI, the events leading to TI by definition fall on the extreme end of the continuum of trauma exposure. Any predictive ability may not be due to the TI response itself but rather due to the severity of the event and the emotional reaction to it. Indeed, from large meta-analytic studies, peritraumatic reactions, life threat, and event severity are some of the strongest predictors of chronic PTSD (Brewin, Andrews, & Valentine, 2000; Ozer, Best, Lipsey, & Weiss, 2003). Thus, to really understand the impact of the TI response itself on subsequent propensity to develop chronic psychopathology, event severity must be separated from the TI construct; otherwise, TI may simply be a proxy variable for event severity.

Assessment

One of the issues that consistently plagues the field of traumatic stress is the reliance on retrospective self-report of event-related characteristics and severity. TI is no exception. This reliance makes the assumption of reliable, objective accounts, undistorted by clinical

state and time (McNally, 2004); however, it is becoming increasingly clear that current clinical status affects how trauma-exposed individuals remember the severity and nature of both objective and subjective event characteristics. Specifically, relative to an earlier assessment, if an individual reports more severe psychopathology at a later assessment, he or she is also more likely to report experiencing a more severe event. This pattern is seen for event characteristics (frequency, Roemer, Litz, Orsillo, Ehlich, & Friedman, 1998; magnitude, Southwick, Morgan, Nicolaou, & Charney, 1997; sensory experiences, Schwarz, Kowalski, & McNally, 1993), emotional reactions during the event (peritraumatic emotions/dissociation, Schwarz, Kowalski, & McNally, 1993; Zoellner, Sacks, & Foa, 2001), and initial occurrence of acute symptoms (Harvey & Bryant, 2000). Thus, the calibration of the occurrence and magnitude of the TI response is likely to suffer from the same problems.

CONCLUDING THOUGHTS

Marx et al. (2008) have redrawn our attention to the well-established nonhuman literature on defense responses and, more specifically, to the construct of tonic immobility, highlighting the potential conditions necessary for the response and potential behavioral markers. They have also added their thoughts to the growing dialogue on translating this construct and related constructs such as freezing and analgesia across species and more specifically to trauma exposure and sexual assault (e.g., Foa, Zinbarg, & Rothbaum, 1992; Marks, 1987). Although there are potential clinical benefits in applying the construct of TI to trauma exposure in general and sexual assault specifically, the application of this construct for research purposes poses challenges of construct definition and assessment. When translating this construct across species, it may be helpful to consider species-specific defense responses (Bolles, 1970). That is, when humans or other animals are confronted with a situation where environmental danger is present, all resources are concentrated on this immediate danger and the repertoire of reactions that are available are limited to those that have evolved to protect the organism (Bolles, 1970; Fanselow, 1997; Rau, DeCola, & Fanselow, 2005). Thus, an organism will use defense behavior in which it has been evolutionarily primed to engage. Bringing this evolutionary perspective more fully to bear may help further isolate necessarily contextual conditions, and a set of behavioral and subjective markers that characterize tonic immobility specifically in humans.

Acknowledgments

This manuscript was supported in part by a grant from the National Institute of Mental Health R01 MH066347 (PI: Zoellner). A special thanks goes to Jeansok Kim, PhD, for the contribution of the David Livingstone quote.

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