Abstract

Mass trauma is a growing concern in the world. Millions of people worldwide have joined the ever increasing family of trauma survivors. The awareness of trauma and its deleterious after effects are dominating this era of human history (Bracken, 2002). By necessity trauma is being repositioned from a peripheral topic of interest to a mainstream subject of study. A new paradigm of trauma recovery is necessary to address such large-scale populations of trauma survivors. This paper presents a foundational theory and method for the use of a body-based intervention for mass trauma recovery. It outlines a simple method of somatic release that can be taught to large-scale populations, can be applied cross-culturally, can be self-directed, and is immediately effective.

Key words: bodily tremors; neurogenic tremors; Post traumatic stress disorder; stress; recovery; mass trauma; large scale trauma; HPA axis.

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Introduction

Natural and human disasters, global acts of political, economic, religious and military terrorism, domestic violence (Galea, et al., 2002), spousal (Houskamp, & Fey, 1991), and child abuse (Clark, et al.,1995) all contribute to increasing degrees of individual and societal post traumatic stress disorder. These large-scale experiences of trauma are producing "cultural trauma", (Sztompka, 2000, p. 449), "mass trauma" (Fullerton, 2004; Prager, 2003; Webb, 2003; Ahern et al., 2002; Kalayjian, & Jaeger, 1995), and "trans-generational trauma" (Fossion, et al., 2003; Gardner, 1999; Rowland-Klein & Dunlop, 1998; & Motta & Jamie, 1997). The typical duration of active PTSD symptoms is more than two decades (Kessler, 2000). The process of healing therefore must be "measured in terms of generations rather than years" (p. 489).

This new global experience of mass trauma, different from individual trauma, requires a new paradigm in trauma recovery to address these epidemic proportions of PTSD. Most methods of trauma recovery however require the guidance and direction of a skilled therapist. Unfortunately, self-directed methods for trauma recovery are rare. This restriction prevents millions of people from being able to find the help they need to recover from PTSD symptoms. It also prevents therapists from being able to provide long-term recovery assistance cross-culturally. In this age of global relief and assistance new methodologies for PTSD prevention and recovery need to be explored. These methods need to be applicable to large-scale populations, can be self-directed, are immediately effective and can be cross-culturally applicable.

The new paradigm of trauma recovery by necessity, will involve recovery techniques that include body-based approaches that can be easily taught to large populations of trauma survivors. Many trauma therapists are recognizing that trauma affects the body as much as it does the mind and the emotions of the individual (Van der Kolk, McFarlane, & Weisaeth, 1996; Van der Kolk, 1994; Zautra, 2003; Van der Kolk, & van der Hart, 1991). Babette Rothschild, a internationally accepted trauma therapist makes the statement that "One only has to read the most basic of the literature on the function of the brain, the nervous system and the physiology of stress to understand that the mind and the body are undeniably linked" (Rothschild, & Jarlnaes, 1994). Likewise, other fields of study are also recognizing that trauma memory is stored in the body. Jean-Pierre Barral & Alain Croibier (Barral, & Croibier, 2000) are osteopathic doctors and have recognized that the tissues of the human body "possess an infallible memory for trauma.

Everything is recorded in them." In brief, the sensorimotor response of the human body is being integrated more thoroughly into traditional psychotherapy practices for trauma recovery.

Somatic Explanation of PTSD

The body-based recovery method discussed in this article was developed while living in several war-torn nations of thousands of traumatized people. (A thorough explanation and illustration of these exercises is out of the scope of this article. They can be found however in Berceli, D. (2007) Körperübungen für die Traumaheilung. Herausgeber Norddeutsches Institut für Bioenergetische Analyse e.V.). These exercises were designed specifically for large populations that do not have access to therapeutic services, methods or materials available in developing nations. It was the result of two war-based experiences. The first somatic experience I became aware of occurred when I was living in the basement of a building being shelled by mortar shells. Eight people representing six different nationalities were in the basement of this building. Each time a mortar shell exploded close to the building we would all jerk and curl into a fetal or semi-fetal position instinctually and spontaneously. At one point as I watched our behavior, I realized that we were moving in unison as though we were trained to move into this position. It was as though it had all been choreographed. It was at this point that I realized that the human body was moving itself into this position in a spontaneous manner. None of us were aware of this, nor did it seem that we had any control over this impulsive movement. I suspected that this instinctual movement must be hard-wired into the human neuro-anatomical network as an instinctual defensive behavior. I became curious as to which muscles were being used to make this movement. I was also curious as to whether or not this repeated movement would create a pattern of muscular tension that was part of the PTSD response. Through personal experience I found that the pattern remained and it eventually created a great deal of chronic muscular tension that was reproduced as part of the PTSD response.

After having studied the physical movement into the fetal position, it became apparent that a very specific set of muscles are used to create this movement. The pattern begins at the adductor muscles, moves through the psoas muscles located at the base of the spine which allows them to travel upwards along the spinal column through the chest cavity and exiting at the neck and masseter muscles. This movement towards the fetal position is an instinctual response to a perceived danger such as a loud sound or an impending automobile collision.

To understand this unconscious physiological reaction we have to look at the human person as an animal species in the process of evolution. Fight/flight responses are organized by the somatomotor system. Functionally, this system helps to control the flexion and extension of the muscle groups used for fight/flight or freeze response during danger. During any traumatic experience the extensor muscles are inhibited so that the flexor muscles can contract. This allows the body to bring the extremities together, "creating an enclosure that gives a sense of safety while protecting the soft, vulnerable parts: the genitals, vital organs, and the head and its contents the eyes, ears, nose and mouth" (Koch, 1981, p. 38).

The powerful psoas muscles are one of the major muscle groups that contract the body during the fight/flight response. The trauma stimulus that triggers flexor contraction of the psoas muscles synergistically inhibits extensor activity of the erector spinae muscles thereby promoting flexor withdrawal. These muscles are the only set of muscles that connect the trunk, pelvis and legs and are considered the fight/flight muscles of the human animal (Koch, 1981). These muscles help pull the body into a semi-fetal position as a way of protecting it from anticipated harm.

Hypothalamus Pituitary Adrenal Axis (HPA)

After understanding this pattern of contraction, it was then possible to develop a series of exercises designed to relieve the chronic stress and tension held in these muscles as a result of traumatic experiences. However, it was first necessary to understand how the body's neurological processes contributed the this muscular pattern of contraction.

Extensive literature has documented the ability of psychological factors to influence the hypothalamic-pituitary-adrenal (HPA) axis (for review, see Lovallo & Thomas, 2000; Sapolsky, Romero, & Munck, 2000). The HPA is a neuro-biological circuitry that is activated at the time of threat to the physical-self or social-self (Dickerson, & Kemeny, 2004). As instinctual beings the activation of this brain system allows emotional arousal to dominate and control human reactions to danger by releasing stimulating hormones into the bloodstream. This process activates the sympathetic nervous system to create a defensive response commonly referred to as the fight/flight or freeze response. LeDoux (1996) postulates that the HPA is an "evolutionary relic" (p. 163) of our more primitive mammalian past. He explains that although the HPA axis is a more primitive neural pathway it acts as a faster alert system than the more "evolved cortical pathway" which controls our thoughts and reflections (p. 164).

This primitive HPA pathway has continued to remain a crucial pathway of defense in the evolution of the human species. Despite our evolution into 'humanhood', the instinctual reactions of the HPA axis still have a greater influence on the reflective cortical pathway than the cortical pathway has on the amygdala. The fact that these two pathways have evolved simultaneously in the human species for millions of years suggests that they both still serve a useful function for humans (p. 163). However, even as an evolved species, humans are still not very effective at willfully turning off those instinctual emotions through a similarly rapid deactivation of the amygdala. It is this inability to deactivate the HPA response that causes post trauma symptoms to continue after the traumatic event has ended. From an evolutionary standpoint it seems rather inefficient that the human animal has evolved with a reactionary HPA axis without having also evolved with a neurological deactivation of that axis.

Extinguishing the Hyperarousal Response: Neurogenic Tremor Theory

Recognizing that the body's survival mechanisms are genetically encoded in the human organism, I began to observe how the body reacted after a traumatic event ended. This led me to my second observation. It came from speaking to thousands of war refugees in several countries of Africa and the Middle East. After hearing many stories from these people, a common phenomenon of uncontrollable tremors emerged. Survivors of very traumatic and often life threatening situations commonly experienced uncontrollable tremors. I was curious as to what benefit these tremors might have for the body since it was a common experience among a vast majority of people from these diverse cultures.

It is well-known and documented that tremors are a common result of a traumatic event. It is not uncommon in many cultures to hear phrases such as: "I was so frightened my jaw was quivering." "My hands were shaking so bad I couldn't calm myself down." "My legs were trembling as I gave my speech." "I was so angry I shook." These tremors are so common that they are also recognized as diagnostic features of Panic Attacks (300.21), Social Phobias (300.23), Generalized Anxiety Disorder (300.02), and Post Traumatic Stress Disorder (309.89) in the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association [APA], 2000).

The onset of these tremors can often be attributed to a traumatic event (Walters & Hening, 1992; Smaga 2003). Even though it is well accepted that body tremors are commonly

present in a number of psychological illnesses, the purpose, etiology and potential therapeutic value of these tremors has received little attention in relation to the number of cases reported. Likewise, although the patho-physiology of tremors has made significant progress, many hypotheses on the purpose and value of these tremors require continued research. Modern psycho-physiology needs to develop and test various hypotheses as a way of developing a rational medical theory and therapy to address this phenomenon (Deuschl, et al., 2001).

While I was researching the purpose of these tremors, I came across a series of articles on animal tremors. The experience of somatic trembling is not only commonplace in our culture but it is a common experience to many mammalian species. These naturally occurring tremors were reported by animal researchers who studied the phenomenon of mammals in their recovery process from life threatening encounters (Smaga, 2003; Levine, 2002; Muggenthaler, 2001). Their observations affirmed that mammals tremor at precise moments in their recovery process from traumatic encounters. Additionally, these tremors are only elicited when the body is using other restorative mechanism. Through these observations, Muggenthaler proposed that there must be a survival advantage to these tremors or they would not have survived the evolutionary process of animals (Muggenthaler, 2001). That being the case, the fact that humans have a tremoring response as well, might suggest that this same mechanism still provides the human mammal with a survival advantage.

This familiar, albeit disconcerting, shaky experience is known as neurogenic tremors. Neurogenic tremors are defined as a primordial somatic experience originating in the natural processes of the brain's procedural memory system (Scaer, 2005). They are a natural part of the genetic composition of the human organism. This generically based discharge of the human organism has a physiological rather than a psychological origin. Neuro-physiological studies in animal experimentation have already demonstrated that physiological shock occurs during the time of a traumatic event. This shock produces a sharp and immediate biochemical reaction in the animal causing the secretion of protective hormones (Deuschl, Raethjen, Lindemann & Krack, 2001). Humans have this same reaction to a perceived threat or danger. The difference between the human animal and other mammalian species is that after a traumatic event has ended for animals in the wild, they use an innate neurogenic 'trembling' mechanism that discharges this high biochemical and neuromuscular charge from the body thereby facilitating a spontaneous recovery from the traumatic event (Levine, 2002; Muggenthaler, 2001; Scaer, 2001).

Muggenthaler (2001) observed that these tremors involve an expenditure of energy at a particularly vulnerable time of physical stress. Since animals do not expend energy uselessly during a threatening or stressful event, it would indicate that these tremors are somehow involved in the survival process. She theorizes that for these tremors to have survived the evolution of the species there must be a survival advantage to this behavior. Scaer (2001) reports, experiments on animals who were not allowed to successfully go though this tremoring process, had a reduced resiliency to subsequent life threatening experiences. This trembling mechanism, according to animal researchers, provides animals with a built-in immunity enabling them to return to normal life after a highly charged life-threatening experience without developing PTSD symptoms (Levine, 2002).

It may be possible that these tremors are also the human animal's natural mechanism for releasing stress related to trauma by deactivating the HPA axis. It may be through the activation of these tremors that humans are able to achieve extinction of the aborted fight/flight response and restore their homeostasis, thereby reducing their post trauma reactions.

Psychotherapy and tremors

Having been trained in Bioenergetic Analysis, a field of body-psychotherapy developed by Alexander Lowen in the 1950s (Lowen, 1958), I was very familiar with these tremors. Bioenergetics is a psychotherapeutic technique that succeeded in extending or translating the therapeutic value of neurogenic tremors from animal research to clinical psychotherapy practice. This was one of the first techniques to recognize and accept tremors as part of the traumatic event and its potential therapeutic healing qualities. Although subsequent techniques have been developed since then, Bioenergetics is the only technique that is steeped in the developmental history and practical application of neurogenic trermors.

Since there is not a great deal of research of body tremors in the psychotherapeutic field of study, it is necessary to extend our vision into the field of kinesiology and muscle research. With the field of physiology several techniques have been designed that use tremors to enhance body performance. The first serious application of tremors on muscle tissue is the field of vibrational therapy. Vibrational therapy on humans was utilized by Russian scientist Vladimir Nazarov in the 1970's, on gymnasts in training for Olympic gold (Issurin & Tenenbaum, 1999). Since then, numerous studies have demonstrated that low-amplitude, low-frequency mechanical

stimulation of the neuromuscular system has positive effects on athletic performance (Cardinale & Bosco, 2003; Torvinen et al., 2002; Bosco et al., 1999). For many years it was primarily used by elite athletes to help increase the strength and coordination of the musculoskeletal and nervous systems and to increase the rate at which athletic injuries heal.

Over time vibrational therapy has developed as a serious field of research known as Biomechanical Stimulation (BMS). It is being used in physical therapy and rehabilitation programs to correct restricted body mobility, range of motion, coordinate musculoskeletal and nervous systems and to increase the rate of healing injuries (Bosco, Cardinale, & Tsarpela, 1999; Bosco et el., 2000). BMS research has demonstrated that exposure to vibration frequencies between 20-50H_z increases bone density in animals. They are also helpful in providing pain relief and the healing of tendons and muscles (Bosco et el., 2000).

Animal tremors, deliberate vibration of muscle tissue and biomechanical stimulation are all suggesting that vibrational stimulation possesses not only healing properties but might also possess survival benefits. The obstacle that must be overcome is the lack of research of natural human vibration and its potential benefits to the human organism. Additional research, ideas and theories regarding neurogenic tremors is necessary to help clarify the potential benefits of tremors within the human body.

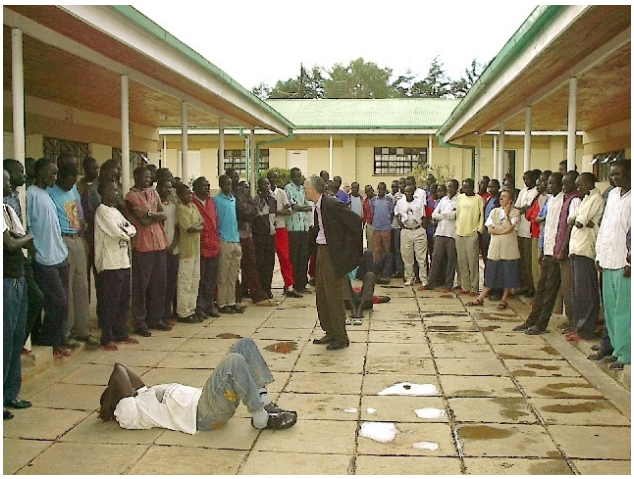
Trauma Releasing Exercises (TRE)

Trauma Releasing Exercises (TRE) is a series of simple exercises that stretch and stress specific muscle patterns throughout the body evoking neurogenic tremors in a controlled and sustained manner (Berceli, 2007). These exercises were designed to evoke neurogenic tremors as a way of releasing deep chronic tension patterns held in the body. These exercises have already been used in nine countries with over 20,000 people.

Although this method can be used with large populations experiencing PTSD from traumas due to external events, it can also be used for childhood developmental traumas as well. The body responds to all traumas in a similar fashion whether it is trauma due to long-term developmental issues or single life threatening events. The following two case studies exemplify how these exercises can be used in various types of trauma recovery.

A client of mine had been ritually abused from childhood. Although he was aware of the abuse, he was also aware that there were additional psychosomatic remnants of the story which

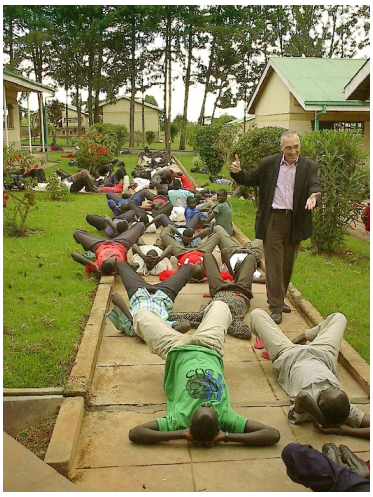
he still needed to uncover for a more thorough healing process. Since many of these traumatic experiences happened during infancy and early childhood, this clients did not have words or memories from these experiences. He only had sensation and intuition as his guides. Since talk therapy was not useful, we were both reliant on the body to give us clues for the direction of each therapy session. It was clear that the client was quite frozen and dissociated from his body. Each time he performed the exercises, the tremors would begin to thaw out the frozen sensation in his muscles by creating greater blood flow. The increased blood flow also generated increased sensations in his body. Because this client had very little bodily experiences that were safe, comfortable or pleasurable, every sensation in his body was immediately associated with terror or pain even though it was simply an increase in blood flow that introduced a healthier sensation in his body. This required us to titrate the tremoring response and proceed very slowly. However, because the tremors are an organic discharge of the human organism elicited to complete the process of discharge of the aborted intrinsic movement pattern of flight/flight response, we were certain that any movement or sensation being created by the body was an exact replica of the history the body had already experienced. Because it had already experienced this sensory stimulation and the client obviously lived through it, he was encouraged that his body could now discharge the experience and finally achieve extinction of the terror reaction that still remained in his body. With each tremoring session, the client's body slowly relinquished its muscular contractions and replaced somatic sensations with increased blood flow, pleasure and aliveness.



Even though this client's history was severe and emotionally painful to explore, the naturally occurring tremors relinquished these contraction patterns with precise detail and exactitude simply because it could only reveal what it had been through. Unlike, the ego, the body could not fabricate its story not confuse it with uncertainty. It could only reveal what was its historical reality. By following the body's lead, the client was able to explore his history with certainty and assuredness that his body was determined to relinquish all the damaging childhood tension patterns that were no longer necessary for an adult lifestyle of safety and healthy relationships.

The second case study comes from having worked in Sudan for three years. At one point, I was asked to visit a school whose entire student body consisted of Sudanese refugee boys. The faculty was having difficulty with these students and also found that their own relationships as faculty were being severely challenged by the student's behaviors. When I arrived, I interviewed both the faculty as well as the student body. What I discovered was that the faculty was experiencing vicarious trauma. This is the unconscious effect of the faculty's thinking due to their intense exposure of traumatic experiences and stories of the Sudanese students. The vicarious trauma was expressing itself though hyperarousal behaviors such as: irritability, over-reaction of emotions, disturbing thoughts and sleeplessness.

During the interview with the student body, it was revealed that none of these students had slept though an entire night since their escape from the war in Sudan. They either had



nightmares of their own, or if they heard other cries or screams of the other boys who were having nightmares, they would wake them up and help console them. Essentially, these boys were left to deal with their own terror, fear and helplessness without the awareness of the adult faculty.

Since this was clearly a long-term recovery process of an entire student body it was necessary to institute these exercises into the daily curriculum of the students. This was achieved by first teaching the entire faculty about the effects of trauma and vicarious trauma on both the faculty and the student body. Since the tremors are effective at distinguishing the hyperarousal reactions of the HPA axis, it was necessary that the faculty learn to incorporate these exercises into their daily routine as a way of down-regulating the amygdala. Once the faculty were familiar with trauma theory as well as the trauma releasing exercises, it was necessary to incorporate these exercises into the daily regimen of the student body. The way this was achieved was through their daily gym class. The gym teachers of the school were taught how to lead the children safely and slowly through the exercises so they could relinquish the

trauma patterns from their bodies at a manageable speed that would allow for integration of new body sensations and awareness.

The stories of the boys' experiences of the tremors were very revealing of their effectiveness. Several of the boys told me that they were surprised to find that they had slept soundly through the entire night. Numerous others told me that they no longer feel anxious and angry throughout the day as they normally did. These were signs that the hyperarousal symptoms were being deactivated by the tremor reaction of the body. When we were performing the exercises as a large group, one of the boys said "it feels as though the war is coming out of my body." This short but insightful comment caused a lot of applauding and comments of affirmation from the other students. Without knowing how or why, these students were experiencing the results of the body's naturally occurring neurogenic process of relinquishing chronic tension patterns in the muscles and allowing the musculature to restore its natural sensation of aliveness.

Discussion

Fear is one of the strongest emotions of all animals because it generates a response that serves to ensure the instinctual survival and perpetuation of the species. It is recognized that the hypothalamic-pituitary-adrenal (HPA) axis is the primary neurological mechanism that ensures the activation of the fight/flight/ freeze response to ensure the survival advantage and therefore evolution of the human species. This reaction to danger is an "evolutionary relic" (LeDoux, p. 163) of the mammalian species that has existed for millions of years suggesting that it still serves as a useful function for humans. From a purely evolutionary standpoint, it is inefficient to have evolved with a reactionary HPA axis without having also having evolved with an autonomic, neural deactivation of that axis. The neurogenic tremors evoked through these exercises might be the mechanism that has naturally evolved within the HPA response to deactivate the HPA axis for the purpose of restoring the individual to a rest/relaxation response after the danger has been extinguished.

Researching neurogenic tremors, that are so commonly felt and yet so rarely studied, may provide new insight into the trauma recovery process. We might discover that the organic neurogenic tremors of the body might be the same self-activation process used by animals in the wild to successfully extinguish their neurobiological defensive reactions. If this is true it might

be possible that the restoration of a psycho-somatic homeostasis of the human species can be achieved through the activation of neurogenic tremors. If this is true, the possibility exists that a new methodology for PTSD prevention and recovery can be designed that is applicable to large-scale populations, can be self-directed, is immediately effective and is cross-culturally applicable.

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