

Trauma-Sensitive Yoga Practice

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## Abstract

The full recognition of the impact of trauma on human functioning grew in the U.S. from studies of Holocaust survivors, Vietnam veterans, battered women, abused children, disaster survivors, refugees, sexual assault and other crime victims. Since the World Trade Center disaster of September 11, 2001, understanding the complex dynamics of trauma has gained national attention in America. Unfortunately, trauma has long-lasting effects and is extremely treatment-resistant. More effective treatment interventions are needed. A growing body of research-based evidence is showing that Yoga practices can reduce physical symptoms and emotional distress associated with trauma related difficulties and increase quality of life. Many of the samples reviewed for this paper are published in non-scientific journals or are small and nonrandomized with study periods being short with confounding variables. However, results of these studies indicate promising possibilities for further study. This paper presents four recent evidence-based research articles regarding applications of Yoga in the treatment of trauma-related issues, primarily post traumatic stress disorder (PTSD), in adult men and women military veterans, active and in-active duty military personnel, and civilians. The conclusion summarizes trauma-sensitive Yoga practice protocols shared in common among these four studies and addresses future study.

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*History, despite its wrenching pain, cannot be unlived,  
but, if faced with courage,  
need not be lived again.*

-- Maya Angelou (1993)

## Trauma-Sensitive Yoga Practice

Introducing Yoga into the field of trauma therapy is a bit like introducing poetry into a physics

class: it is a leap from the objective to the subjective, from the empirical to the felt. . . .

Trauma exists in the space between the scientific--the neurological, the chemical and the effect on the organism as a whole--and the individual's subjective experience of what life is like now, post-trauma. Yoga can meet people in this space between: where the body and mind, science and the subjective converge (Emerson, 2008, p. 3).

Yoga is an ancient discipline that originated in early civilization on the Indian subcontinent and has been practiced throughout East Asia for over 5000 years (Khalsa, 2004, p. 270). Today, it is one of the top ten complementary and alternative medicine (CAM) modalities used in the United States. Practitioners of this ancient Indian system of health care use breathing exercises, stretches, and meditation to balance the body's energy centers. People not only practice Yoga for general health and fitness, but also for a variety of health conditions and mental health related issues including but not limited to anxiety disorders and stress, asthma, high blood pressure, and depression (NCCAM, 2007, p. 3). The reasons for the use of CAM popularity go beyond the practical. People seeking alternative medicine are not necessarily dissatisfied with conventional medicine, but because they find health care alternatives to be more congruent with their own values, beliefs, and philosophical orientations toward health and life (Astin, 1998, p. 1660).

In 1992, The National Center for Complementary and Alternative Medicine (NCCAM) was established at the National Institutes of Health to evaluate alternative methods of treatment and integrate those that are effective into mainstream health care practice. NCCAM is part of the United States Department of Health and Human Services Substance Abuse and Mental Health

Services Administration (SAMHSA) and defines CAM health care as a practice that emphasizes the interrelationship between mind, body, and spirit (2010, p. 1). NCCAM is currently funding clinical trials to study the effects of Yoga, and other CAM, on everything from insomnia to diabetes, HIV disease, cancer, immune function, and chronic obstructive pulmonary disease (2010). The 2003 President's New Freedom Commission on Mental Health Final Report reflects

the contributions of this research by calling for a transformation of the U.S. mental health system by building systems that are evidence-based, recovery-driven, and consumer- and family-driven (p. 1). In 2005, SAMHSA developed a Federal Mental Health Action Agenda that emphasized the initiation of a national focused effort on mental health services for children to promote early intervention for those at risk of mental disorders and to identify strategies to serve children in relevant systems (p. 4). In 2007, the U.S. Department of Defense created the Defense Center for Excellence for Psychological Health and Traumatic Brain Injury for similar purposes. In 2008, the U.S. Army unveiled a \$4 million program to investigate complementary and alternative therapies. This isn't the first time the military has investigated nontraditional approaches. The semi-legendary "First Earth Battalion" immortalized in the recent popular movie; *The Men Who Stare at Goats*, advocated that soldiers utilize non-traditional methods for health and wellness, particularly for expanding their consciousness and mental capacities (Shachtman, 2008, p. 1).

Although the findings of some of the studies reviewed for this paper are yet to be published, their progress and implications have gained national attention in the U.S. media, i.e.; recent articles published in the *Smithsonian* (2010, September, p. 68-71) and *Yoga Journal* (2010, August, p. 74-76 & 99-104). Up until recently, understanding the benefits of practicing Yoga, particularly how it influences brain function, has largely been based on intuition rather than

scientific investigation (van der Kolk, 2009, p. 12). Although mindfulness and meditation are an integral part of Yoga practice, the applications and effects of mindfulness in behavioral health practices (Baer et al., 2005; Bishop et al., 2003; Cahn et al., 2006; Davidson et al., 2007; Grossman et al, 2004; Segal et al., 2002; Zimmerman, 2009); primarily mindfulness-based stress reduction (Kabat-Zinn et al., 2003; Shapiro et al., 2000; Stauffer, 2007) and the Relaxation Response (Benson, 1975; Lazar et al., 2000), have been previously examined in published studies and reports. Recent advances in the study of neurobiological effects of stress (Cahn & Polich, 2006; van der Kolk, 2006; Ford, 2005; Gondim, 2008; Spinazzola et al., 2001) have contributed to validating the mind-body connection and the importance of psychological disturbance in the body (Blaustein et al., 2005; Mayer & Saper, 2000; Wylie, 2009; Ogden et al, 2006; Perry et al, 2000; Ohan et al., 2002) and have informed the basis of the literature review represented in this paper.

The development of trauma theory is one of the most significant advances in the field of psychiatry of the twentieth century. It provides a framework for understanding how environmental stressors cause what we call mental illness (Bloom, 2000, p. 1). The full recognition of the impact of trauma on human functioning grew in the U.S. from studies of Holocaust survivors, Vietnam veterans, battered women, abused children, disaster survivors, refugees, sexual assault and other crime victims. Since the World Trade Center disaster of September 11, 2001, understanding the complex dynamics, causes, recovery, and prevention of trauma has gained national attention in America. The previously mentioned growing body of scientific evidence validates the important role of complementary and alternative medicine (CAM) in the development of an integrative conceptual framework that has been absent in our

behavioral health care systems (Bloom, 2000, p. 3). Understanding trauma means changing “mental modes” and our very basic assumptions about how we view all kinds of individual and social behaviors and maladaptations, moving from viewing people as “sick” or “bad” to “injured” (p. 4).

Given the prevalence of trauma exposure in our society and the complicated nature of its symptoms, effective treatment interventions are essential. Unfortunately, trauma has long-lasting effects on mental health and is extremely treatment-resistant (Emerson et al., 2009, p. 123). A recent meta-analysis of 26 studies found that 45 percent of therapy clients with PTSD remain significantly symptomatic after treatment, and two thirds relapsed six months after treatment (Bradley & Westen, 2005, p. 218). Since October 2001, about 1.6 million U.S. troops have deployed to the wars in Iraq and Afghanistan, with many exposed to prolonged periods of combat-related stress or traumatic events. Nearly 20 percent of military service members who have returned; 300,000 in all, reported symptoms of post traumatic stress disorder or major depression and approximately 19 percent reported that they experienced a possible traumatic brain injury. The lifetime costs of treating these ailments could pile up to as much as \$35 billion (RAND, 2008, p. 1). There is great need to continue exploring effective treatment interventions and adjunctive therapies for trauma survivors.

An essential aspect of recovering from trauma is learning new ways to calm down, or self-regulate (Emerson et al., 2009, p. 124). For thousands of years, Yoga has been offered as a practice that helps calm the mind and body. A growing body of research-based evidence is showing that Yoga practices can reduce autonomic sympathetic activation, muscle tension, and blood pressure, improve neuroendocrine and hormonal activity, decrease physical symptoms and emotional distress, and increase quality of life (Emerson et al., 2009, p. 124; Sarang & Telles,

2006, p. 462; Benson et al., 1975, p. 381). For these reasons, Yoga is a promising treatment or adjunctive therapy for addressing cognitive, emotional, and physiological symptoms associated with trauma and post traumatic stress disorder (Emerson et al., 2009, p. 124).

This paper will examine the most current evidence-based research regarding the applications of Yoga in the treatment of trauma-related issues, primarily post traumatic stress disorder (PTSD), in adult men and women military veterans, active and in-active duty military personnel, and civilians. A brief overview of Yoga, PTSD, and trauma-sensitive behavioral health practice will provide a foundation for understanding the context for trauma-sensitive Yoga practices. Numerous existing programs offering Yoga as a treatment to trauma-related symptoms were discovered in the research for this paper. This paper will review four studies including three different programs that are currently teaching trauma-sensitive Yoga as well as training clinicians and Yoga teachers in these techniques. The first article (van der Kolk, 2006) provides the scientific foundation for understanding why trauma-sensitive Yoga is an effective treatment of trauma related symptoms. The author, Dr. Bessel van der Kolk, M.D. is a world-renowned leader in the research and treatment of trauma and is among those responsible for codifying the original diagnosis of PTSD after the Vietnam War. In 2003, he founded the Trauma Center of the Justice Resource Institute located in Brookline, Massachusetts. The second article describes research being done at the Trauma Center and the protocols of their trauma-sensitive Yoga program (Emerson et al, 2009). The final articles review two separate protocols developed specifically for the military population. The third article describes the findings of a military medical research feasibility study conducted by the Samueli Institute and sponsored by the Department of Defense with the Uniformed Services University of the Health Sciences in collaboration with the Deployment Health Clinical Center at Walter Reed Army

Medical Center in Washington D.C. (Cockfield, 2006). This feasibility study and its conclusions lead to the development of a manualized Yoga protocol called iRest of which is currently being taught throughout several U.S. military health centers as well as to civilians.

The

fourth article describes the effects of Yoga on symptoms of combat stress in active duty military personnel and is called Yoga Warriors (Stoller et al., 2010). This study is a military grant awarded to the Central Massachusetts Yoga and Wellness, Inc. (2010). The results of this study are currently in the data analysis stage. Updates from Yoga Warriors Research program are included in this literature review. The final sections of this paper will review the similarities of these studies with concluding remarks regarding future directions for the applications of trauma-sensitive Yoga practice in medical and behavioral health care. An Appendix found at the end of this paper provides examples of the Yoga exercises mentioned in this paper and additional background information on the history, language, and styles of Yoga.

### **Research of Therapeutic Yoga Applications: Challenges and Limitations**

The very nature of Yoga can make it awkward to examine in an objective evidence-based manner. Much of the existing research has been conducted by Indian investigators and published in Indian journals. The first systematic medical applications of Yoga started in India in 1918 at the Yoga Institute at Versova near Mumbai and the Swami Vivekandanda Yoga Research Institute near Bangalore (see Appendix A) and subsequently spread internationally with the establishment of the International Association of Yoga Therapists and Yoga Alliance based in the United States (Khalsa, 2004, p. 271). Several notable American evidence-based publications

have contributed to establishing scientific validity of the therapeutic applications of Yoga and are utilized as references for this paper; The Lifestyle Heart Trial research (Ornish et al., 1990), established scientific evidence of the positive impact of Yoga on heart disease in the U.S. In 2001, Dr. David Coultier, M.D. published *The Anatomy of Hatha Yoga: A manual for teachers, students, and practitioners*. This text provides detailed photos of anatomically correct interpretations of Yoga postures including an in-depth discussion regarding benefits and counter indications specific to each posture. In 2007, Dr. Timothy McCall, M.D. (also the medical editor of the popular magazine; *Yoga Journal*) published the text, *Yoga as medicine: The Yogic prescriptions for health and healing*, a comprehensive review of relevant scientific research, and in-depth coverage of injury prevention and contraindications to safe Yoga practice.

Sat Bir Singh Khalsa, PhD, Assistant Professor of Medicine at Harvard Medical School identifies in his 2004 bibliometric analysis of therapeutic applications of Yoga in 181 articles in 81 different journals published in 15 different countries with the majority being from India and 43 publications in 24 U.S. journals, three types of disorders most evaluated in Yoga studies: psychiatric conditions, cardiovascular disorders, and respiratory disorders (p. 273). Khalsa notes a number of cautions. A wide range of types of Yoga interventions are described ranging from individual breathing techniques, postural techniques to complete Yoga lifestyle interventions involving dietary and psycho-spiritual techniques with no single standardized Yoga practice format. Additionally, the interventions are equally varied from individual practice to group sessions, from daily practice sessions to weekly sessions, and from short duration to long duration sessions. However, Khalsa (2004) notes an increase in scientific interest in Yoga as an

alternative medical intervention in the West and increased funding by U.S. government agencies such as the National Center for Complementary and Alternative Medicine is helping to improve the quality of research (p. 276).

Many of the published research and study samples reviewed for this paper are small and nonrandomized with study periods being short with confounding variables or published in non-scientific journals. The resources utilized for this literature review included electronic databases primarily Medline (PubMed) and Psycinfo and from the required reading list and lectures found in the 9-month Traumatic Studies Certificate program at the Trauma Center of the Justice Resource Institute in Brookline, Massachusetts and trauma-sensitive Yoga teacher training as well as Yoga Warriors Teacher training at the Central Massachusetts Yoga and Wellness Center in Boylston, Massachusetts.

Researchers and practitioners are discovering that the criteria and diagnosis of PTSD does not capture all that encompasses the complexity of adaptation to other forms of trauma such as chronic childhood abuse and neglect, nor that it adequately addresses the cultural differences that may influence responses to traumatic events. The exploration of these details exceed the scope of this paper, however, a brief overview of important features from these components will precede the review of the above mentioned studies.

### **What is Yoga?**

The total system of a complete Yoga practice involves more than physical postures (see Appendices B, C, D). Dr. Timothy McCall, MD; medical editor of the *Yoga Journal* (2010), says in his recent publication; *Yoga as Medicine* (2007), it is important to understand that Yoga has a

different view from Western medicine's about what defines health—and this may be a big part of why it is effective. The absence of symptoms does not define the entire scope of health from the view of Yoga practice (p. 3). This is consistent with the perspective of Eastern practitioners and researchers Saraswati and Amarajyoti (1993):

. . . in the West, definitions of mental health tend to relate to the absence of maladaptive behaviors and freedom from symptoms. This tends to view a healthy person as one who conforms to normal social expectations of behavior—maintains a job, relationships, is friendly, etc. . . . A different view, which is perhaps higher and more difficult to attain, is one that gives meaning to our lives in a way that mere social success cannot. Mental health, then, could be defined as a whole balanced person, living a life which is in harmony with themselves and the universe around them. If we choose to view it that way, then social success has little meaning. (p. 435)

The practice of Yoga encompasses more than addressing singular issues such as a headache

or joint pain—or being a cure for cancer or a weight loss strategy (McCall, 2007, p. 6).

Yoga

is about optimizing the function of the whole body including each system from the muscles and tissue to circulation and digestion as well as emotional and spiritual well-being.

The Yoga perspective is about observing, recognizing, and responding to the interconnectedness of cause and effect. It is more complex than the limited singular factors considered by traditional Western medicine. In the practice of Yoga, a peace of mind is

cultivated which affects the nervous system and the immune system, and the cardiovascular system as does the physical challenges of stretching and strengthening muscles and affects circulation, digestion, and breathing (McCall, Yoga says that if you look clearly you will see

that everything about you is connected to everything else and therefore is a holistic strategy for health and well-being. (McCall, 2007, p. 6)

Hatha Yoga (pronounced HOT-uh, not HATH-ah—meaning discipline) is the most common practice in the United States (McCall, 2007, p. 8) (see Appendix E).

Yoga has a spiritual component but it is not a religion; it is a systematic technology to improve the body, understand the mind, and free the spirit. . . . Yoga practice strengthens and

calms the nervous system, increases blood flow to internal organs bringing more oxygen to your cells. . . . It clears the mental clutter and allows opportunity to see things more clearly and can be individually adapted. (McCall, 2007, p. 7)

Dr. David Coultier, Ph.D., the principle investigator for neuroscience research funded by the National Institute of Health and Natural Science Foundation and Professor of Cell Biology at Columbia University College of Physicians and Surgeons, and a practitioner of Yoga since 1974, says in his text *Anatomy of Hatha Yoga* (2001):

. . . after considering the subject for 25 years, it is clear that the study of Yoga might well interweave two themes; for the benefit of completeness, a traditional treatment of how to do Yoga postures using anatomically precise terminology, and, for correlations with medical

science, an objective analysis of how those postures are realized in some of the great systems

of the body. . . . Most important being not flexibility and ability to do difficult postures, but awareness—of the body and the breath . . . of anatomical and physiological principles that underlie each posture . . . from awareness comes control and from control comes grace and beauty. (p. 23)

### **National Attention on Defining Trauma-Informed Behavioral Health Care**

The President's New Freedom Commission on Mental Health (2003) calls for a transformation in America's mental health care systems (p. 1). Since its publication, a national coordinated effort among multiple agencies and organizations, as well as an effort to collect consumer input, has generated cutting edge research-based evidence and recommendations for new models of care that are strengths-based and family centered. The report *Models for Developing Trauma-Informed Behavioral Health Systems and Trauma-Specific Services*, published by the National Technical Assistance Center for State Mental Health Planning (2003), presents compelling data regarding the prevalence of co-occurring mental health and substance use disorders related to the impact of untreated trauma-related issues. The findings of this report consistently reflect the critical need for trauma-informed behavioral health care;

- 90% of public mental health clients have been exposed to multiple experiences of trauma;
- 75% of men and women in substance abuse treatment report abuse and trauma histories;
- teenagers with alcohol and drug use problems are 6-12 times more likely to have a history of being physically abused, and
- 18-21 times more likely to have been sexually abused than those without alcohol and drug use problems. (p. 7)

In 2004, fifteen recommendations were published in their follow-up report *Developing Trauma-Informed Behavioral Health Systems*;

. . . the majority of clients served by public mental health and substance abuse services have been exposed to multiple experiences of trauma . . . including domestic violence, abuse, neglect, natural disasters, crime, and war . . . most of these survivors present with co-occurring disorders and should be provided with integrated mental health and substance abuse services . . . that are recovery-oriented and emphasize voice and choice. (Blanch, 2004, p. 10)

The recommendations from the National Trauma Consortium for the Center for Substance Abuse Treatment published in their report; *Enhancing Substance Abuse Recovery Through Integrated Trauma Treatment* (2004, June) state

all trauma-specific services should be delivered within the context of a relational approach that is based upon the empowerment of the survivor and the creation of new connections. . .

trauma-informed or trauma-sensitive services take into account knowledge about trauma—its

impact, interpersonal dynamics, and paths to recovery. The primary goals of trauma-specific

services are more focused to address directly the impact of trauma on people’s lives and to facilitate trauma recovery and healing. (p. 4)

Researcher John Herman states in his text *Trauma and Recovery: the aftermath of violence from domestic abuse to political terror* (1992):

. . . recovery cannot occur in isolation. It can take place only within the context of relationships characterized by the belief in persuasion rather than coercion, ideas rather than

force and mutuality rather than authoritarian control, precisely the beliefs that were shattered

by the original traumatic experience. (p. 18)

### **The U.S. Military**

Since October 2001, about 1.6 million U.S. troops have deployed to the wars in Iraq and Afghanistan, with many exposed to prolonged periods of combat-related stress or traumatic events. Evidence suggests the psychological toll of the deployments may be disproportionately high compared with physical injuries. Nearly 20 percent of military service members who have returned; 300,000 in all, report symptoms of post traumatic stress disorder or major depression (RAND, 2008, p. 1).

In 2008, the findings from the first large-scale, nongovernmental assessment of the psychological and cognitive needs of military service members who have served in Iraq and Afghanistan over the past six years was published in a 500-page report. This RAND study is the first to comprehensively assess the current needs of returned service members from all branches of the military. It is estimated PTSD and depression among returning service members will cost the nation as much as \$6.2 billion in the two years following deployment — an amount that includes both direct medical care and costs for lost productivity and suicide. Investing in more high-quality treatment could save close to \$2 billion within two years by substantially reducing those indirect costs.

The report concludes a major national effort is needed to expand and improve the capacity of the mental health system to provide effective care to service members and veterans. The effort must include the military, veteran and civilian health care systems, and should focus on training more providers to use high-quality, evidence-based treatment methods and

encouraging service members and veterans to seek needed care.

### **Historical Roots of the Study of Trauma in Psychiatry**

The development of trauma theory is one of the most significant advances in the field of psychiatry. . . . It provides a framework for understanding how environmental stressors cause what we call mental illness. It validates the power of terror on the mind and on the body (Bloom, 2000, p. 1). Although the medical field has acknowledged unique features of war-related psychological trauma expressed in terms of “shell shock” (van der Kolk, et al., 1996), it was not until the 1970’s that the study of trauma in behavioral health emerged. The rise of feminism and the domestic violence movement brought public attention to the needs of survivors. At the same time, overwhelming needs of returning Vietnam veterans spurred psychiatry to identify a more effective method for identifying symptoms and designing specific treatment, thus the establishment of post traumatic stress disorder (PTSD) criteria in the American Psychological Association Diagnostic Statistic Manual III (Blanch, 2003, p. 2).

In the 1990’s the Substance Abuse and Mental Health Services Administration (SAMHSA) developed a specific agenda on women’s issues and gender specific treatment pertaining to PTSD. In 1994, a landmark national conference, *Dare to Vision*, brought together more than 350 survivors, practitioners, and policymakers in a forum designed for sharing and discussing problems and potential solutions. It became clear that complex PTSD manifests differently in women than in men, and that it is critical to tailor programs and services to the different needs of women and men. Researchers began to look at the effectiveness of various interventions and at the cost of leaving trauma untreated (Blanch, 2003, pp. 2-3).

### **Developmental Trauma Disorder**

The impact of interpersonal trauma has also received national attention. Although this is not the focus of this paper, it is important to mention as an example of the complex nature of trauma and the diverse research necessary to identify effective treatment and prevention. Over the last 30 years of studying child abuse, many researchers have looked at emotional maltreatment as the core component of child abuse. The *failure to thrive syndrome* involving an infant's failure to grow despite adequate nourishment was first systematically studied by Rene Spitz in the 1945 landmark study of "hospitalism" demonstrating the impact on infants of a disrupted attachment relationship (Navarre, 1987). Improved scientific study, particularly with the use of magnetic resonance imaging (MRI) of the brain, has increased our understanding of the neurobiological effects of trauma. The study of the effects of neglect and trauma on early attachment relationships has created a surge of evidence contributing to the proposal of a new DSM Diagnosis: Development Trauma Disorder. This proposal expands the criteria of the existing diagnosis of PTSD and disorders of extreme distress to address the unique features of children affected by complex trauma (Stolbach, 2007, p. 4). Perhaps most importantly, this understanding provides direction for the development of more effective treatment and validates the importance of early intervention in families with infants and young children.

### **Homeostasis and Brain Plasticity**

Our environment, genetics, experience, and emotions affect our brains on a cellular level. All of this influences the way cells reproduce and grow, and transmit messages, and atrophy and die (Perry, 2006, pp. 239-242). Changes within the chemical and electrical composition of the cells and brain tissues, develop over time in response to an individual's environmental cues. These influences contribute to the development of specific regions of the brain as well as develop

maladaptive changes at both the structural and cellular levels. The brain's physical health impacts how we interpret, understand, and react to our environment. Over time, perceptions of environment and interpretation of experiences continue to influence the brain's physiological structures and impact an individual's ability to function within a given range of physical and emotional health (Zimmerman, 2009, p. 11).

Unconscious and conscious memory are the central component of learning, formation of worldview, and antecedent to emotional self-regulation skills, mental health status, affect, behavioral patterns, and substance abuse causality (Perry et al., 1991; Perry & Szalavitz, 2006). Memory encompasses and recalls somatic states connected to earlier experiences that affect blood pressure, heart rate, breathing patterns, emotions, and neurological functioning including the release of endorphins, cortisol, and other stress-related hormones. This is what creates the sensation or experience of peaceful relaxation while remembering a pleasant experience or the very opposite experience of tension and anxiousness when unpleasant memories surface. Fearful

or stressful memories do not need to be conscious in order to create a physiological response (Ogden, Minton & Paine, 2006; Perry et al., 1991; Gondim, 2008).

Somatic memories do not have to be trauma-related to affect our daily life (Gondim, 2008). Recent research has brought understanding of experientially rooted behavioral responses and the subsequent underlying brain changes, known as *brain plasticity*, to the treatment of individuals experiencing mental illness and substance abuse challenges (Perry et al., 1991; Perry & Szalavitz, 2006). Our brain regulates our physio-emotional states and seeks to maintain a balance at both the cellular and behavioral levels that will allow us to survive, also known as homeostasis. This state of balance varies according to each person and, dependent upon life

experiences, represents a continuum ranging from withdrawn, to calm and alert, to hypervigilant (Ogden et al., 2006).

### **The Triune Brain**

Paul D. MacLean, one of the leading brain scientists of the 20th century is best known for identifying and naming the limbic system in 1952. In 1990, he summarized his lifetime of research in his magnum opus, *The Triune Brain in Evolution* (see Appendix F). There he discussed the ramifications of the limbic system concept and his subsequent findings on brain evolution and behavior culminating in his proposal of a new brain model he called “the Triune Brain.” His research has altered our view of *Homo sapiens* and our understanding of brain evolution and behavior (Newman & Harris, 2000, p. 3). MacLean was aware of Paul Broca’s (Broca, 1878) observation that the ‘limbic lobe,’ so named because it surrounds the brainstem, is common to the brains of all mammals. He was intrigued with James Papez’s (Papez, 1937) proposal that emotional experience is based on connections linking the hypothalamus with the limbic lobe (MacLean, 1993). MacLean’s curiosity about subjective emotional experience arose from his earlier work with people with psycho-motor epilepsy whose symptoms included emotional feelings and viscerosomatic symptoms (MacLean, 1949, p. 52). Seeking to account for sensations involved in the visual, olfactory, and auditory auras associated with these seizures, he reasoned that the external sensory apparatus must have access to the brain circuits where seizures arose and that cortical association pathways could potentially connect visual, auditory, and somatic neocortical areas with the hippocampus. MacLean reconceptualized Papez’s proposal and suggested that a circuit consisting of the limbic lobe and its major connections in the forebrain—the hypothalamus, amygdala, and septum—constituted a “visceral brain”

(MacLean, 1949, p. 53). Seeking greater clarity, he introduced the term “limbic system” (MacLean, 1952, p. 72) soon afterward. He wrote that emotional feelings elude “the grasp of the intellect” (MacLean, 1949, p. 348) because their origins lie in evolutionary primitive structures preventing their communication in verbal terms. He wrote that this underlying neurobiology provides a clue to understanding the difference between what we feel and what we know (MacLean, 1993). His research focus on the limbic system led to the establishment of the Limbic Integration and Behavior Center at the National Institute of Mental Health.

The concept of three major functions of the brain is helpful in understanding the dynamic of trauma-related challenges. The amygdala, also referred to as the reptilian brain, responds to stressful and fearful experiences by signaling the release of stress hormones to stimulate increased heart rate, respirations, and alertness. The prefrontal cortex manages executive functions, thought process, and planning. The right prefrontal cortex manages impulse control and inhibition (Perry, Conroy, & Rivitz, 1999; Perry, 2006; Ehrenberg & Prinz, 2007). The right prefrontal cortex monitors both the environment and body for signs of danger. The amygdala reacts quickly to perceived internal and external cues, while the left prefrontal cortex takes longer to analyze and plan. During times of perceived danger the amygdala assumes control to prepare for survival and overrides the prefrontal cortex. The amygdala orchestrates physiological and behavioral responses before the prefrontal cortex can determine whether or not the environment actually requires a survival-based response (Gondim, 2008).

### **Hypervigilance**

When an individual is repeatedly exposed to perceived danger, the brain’s physical structures

begin to adapt and change, setting homeostasis at a level of hypervigilance, always prepared to respond to threats. This microphysical adaptation is known as plasticity (Perry, Conroy, & Ravitz, 1991; Goleman, 2003; Davidson, 2004; Perry, 2006). This type of cellular and structural change is more likely to occur if repetitive stress or trauma is experienced at a young age, particularly pre-verbal, while the brain is still developing and has not integrated past experiences of safety and calm as a normal environmental quality. Children who have been exposed to repeated trauma are more likely to exhibit signs of hypervigilance such as increased anxiety, startle response, and dysphoria. Continuous arousal resets individual responses to perceived danger at unusually high levels and escalates responses to everyday environmental cues to include panic, disorganized thinking, violence, avoidance behaviors, and withdrawal (Perry, 2006, p 232). This phenomenon of adaptation of the brain's processing and response systems is an example of brain plasticity (Gondim, 2007).

Individuals living in a state of hyper vigilance, stress, or fear will more fully develop the right pre-frontal cortex and amygdala while left pre-frontal cortex, used for higher, cognitive functioning will begin, over time, to atrophy (Goleman, 2003; Perry, 2006). Neural connections will be more complex and numerous within the amygdala and less than normally expected within the frontal lobes. These changes in the structure of the brain further lessen the likelihood that stressed and traumatized individuals will be able to effectively focus attention, plan, and respond to their environment in an appropriate and healthy manner that allows for both the learning of new skills and supports normal brain development (Perry, Conroy, & Ravitz, 1991; Mayer & Saper, 2000). Behavioral acting out, delinquency, self-harming behaviors, substance use and abuse, self-medication, PTSD, depression, and anxiety disorders, can be symptomatic of

neurophysiologic responses to the environment.

Trauma and subsequent emotional dysregulation, negative thought patterns, and behavioral acting out influence the brain at both the gross physical and cellular levels, promoting the development of neurophysiologic brain structures that reinforce and promote continued maladaptive behavioral responses. In the absence of intervention that incorporates therapeutically structured environmental controls with ongoing opportunities for adaptation to a safe environment, facilitated learning of new responses and behaviors, and time for physiologic restructuring/plasticity changes, both the behaviors and underlying physiologic structures will continue to work in tandem, escalating behavioral responses while decreasing chances that the individual is able to learn to perceive and respond to environmental cues in a more behaviorally appropriate manner (Perry, 2006). The removal of trauma-inducing conditions, institution of therapeutic interventions, and the practice of healthy mindfulness-based behavioral responses support the redevelopment of neurophysiologic structures that are able to initiate and sustain more healthy and appropriate responses to environmental cues (Teasdale et al., 2000; Bishop et al., 2004; Kabat-Zinn, 2006). This understanding of the neurobiological nature of the trauma-related symptoms identifies the need for specific therapeutic approaches that activate these regions of the brain in order to establish and develop new connections.

### **The Fight or Flight Response and Anxiety**

Understanding the influence stress and trauma have on the occurrence of illness and mental health disorders, particularly the neurobiological component of this relationship, provides an important foundation for the rationale of using trauma-sensitive Yoga practices as a treatment option. According to the Anxiety Disorders Association of America (2010), anxiety is now the most commonly diagnosed mental illness in the country. The most common forms of anxiety,

in

order of prevalence are generalized anxiety disorder, characterized by worry and catastrophizing; obsessive compulsive disorder, the inability to control unwanted thoughts or behaviors; panic disorder, episodes of intense fear that surface without warning and may result in physical symptoms such as abdominal pain and heart palpitations; post traumatic stress disorder, which manifests as persistent fear long after the experience of a traumatic event; and phobias, or irrational fears. Treatment varies from medication, talk therapy, and cognitive behavioral therapy and use of relaxation techniques. Research has indicated that Eye Movement Desensitization

and Reprocessing (EMDR) (see Appendix G) has proven to be successful with some people who seek treatment for PTSD. However, long-term improvement continues to remain elusive.

Our biology is designed to adapt and survive. When our brain senses danger, our heart rate increases without us making a conscious decision for this adaptation. This is the primary purpose of our autonomic nervous system; to respond without thought and is part of what we know as the “fight or flight” response. Our endocrine system begins pumping adrenaline and cortisol that gives us additional energy. The digestive track shuts down and breath quickens flooding the blood stream with oxygen and the heart rate increases to quickly circulate that rich oxygenated blood through the body. The frontal lobes of our brain, where logical thinking and decision making is processed, also shut down. In time of crisis, survival depends on quick response rather than on logical problem-solving. This response is warranted in times of legitimate crisis, but, when this heightened state is induced unnecessarily, it can trigger a panic or anxiety attack. In some cases, rapid breathing causes hyperventilation which causes more carbon dioxide to be exhaled at a greater rate and low levels of carbon dioxide make the body

more alkaline, which leads to more hyperventilation; a vicious cycle that not only prevents the body from slowing down but also interferes with the blood's ability to release oxygen to the tissues.

### **The Relaxation Response**

Breathing is an automatic response that we also have control of, if we choose to exercise that control. This knowledge alone, is empowering because it provides the element of choice in how to respond to stressful situations. In the 1970's Herbert Benson, MD, founder of the Mind/Body Medical Institute at Harvard Medical School (2010), found that practicing a simple meditation technique developed by Yogi Maraishi Mahesh (see Appendix A), could lower blood pressure, improve heart health, and reduce stress levels. This technique has become known as the "relaxation response". Benson's research spawned additional studies that explore the scientific basis of meditation and the idea that our mind can relax our body.

In July 1992, Jon Kabat-Zinn, PhD, founder of the Center for Mindfulness at the University of Massachusetts Medical School, published a study in *The American Journal of Psychiatry* concluding that mindfulness meditation was also an effective way to reduce anxiety and panic. Another study published in the *Journal of the American Medical Association* (May 17, 2000) found that slow diaphragmatic breathing (similar to the pranayama technique Deergha "complete breath" (see Appendix H and I) or three part breathing, from the Integral Yoga tradition proved just as effective in reducing anxiety as the antidepressant drug imipramine (Khalsa, p. 62). Swami Karunananda, senior teacher at the Yogaville in Buckingham, Virginia, specializes in using pranayama to deal with fear, anger, and depression says, "The breath and mind go together . . . if the breath is calm steady, and even, so are we. . . . Breaking down the breathing patterns

that exacerbate anxiety is key to the success of pranayama as an intervention“ (2010, p. 5).

### **Stress and illness: The ACE Study**

The link between stress and illness provide a gateway for understanding the need for developing prevention and intervention treatment strategies.

The majority of clients served by public mental health and substance abuse services have been exposed to multiple experiences of trauma . . . including domestic violence, abuse, neglect, natural disasters, crime, and war . . . most of these survivors present with co-occurring disorders and should be provided with integrated mental health and substance abuse

services. (Blanch, 2004, p. 10)

Additional evidence validating the connection between stress and the occurrence of illness is found in The Adverse Childhood Experiences (ACE) Study (Felitti et al., 1998). The ACE study is perhaps the largest scientific research study of its kind, analyzing the relationship between multiple categories of childhood trauma and health and behavioral outcomes later in life.

The study was designed to assess the relationship between the childhood experiences and the current health status and health risk behaviors of 30,000 mainly middle-class adult members of Kaiser Permanente. To date, the data has been collected from 19,000 participants. The study indicates that childhood abuse and household dysfunction lead to the development—decades later--- of chronic diseases that are the most common causes of death and disability in this country, including heart disease, cancer, stroke, diabetes, skeletal fractures, chronic lung disease, and liver disease. A strong relationship is shown between the number of adverse childhood

experiences and reports of cigarette smoking, obesity, physical inactivity, alcoholism, drug abuse, depression, suicide attempts, sexual promiscuity, and sexually transmitted diseases. In addition, those who reported larger numbers of adverse experiences were more likely to have multiple health risk behaviors. The more often these adverse childhood experiences are reported,

the more likely the person will develop chronic and disabling illnesses. Perhaps most importantly, this study challenges what has been traditionally viewed as public health or mental health problems by indicating these behaviors appear to be coping mechanisms for people who have had adverse childhood experiences. The authors of this study suggest these adaptive behaviors may also reflect the effects of the adverse experiences on the developing brain chemistry—effects that may lead to the adoption of the same coping behaviors (2010, p. 1).

### **Post Traumatic Stress Disorder**

It's been called by many names - soldier's heart, shell shock, combat fatigue, and post-Vietnam syndrome. Most recently, it is known as post traumatic stress disorder (PTSD), and currently affects one in eight service members returning from combat in Iraq and Afghanistan. Its symptoms are varied and include intrusive thoughts, nightmares, flashbacks, depression, hypervigilance, insomnia, irritability, and feelings of guilt. Secondary problems related to PTSD include substance abuse, fits of violence or rage, dangerous behaviors, and relationship difficulties (Vaughan, 2010, p. 1).

Although posttraumatic stress disorder (PTSD) is among the most common psychiatric disorders (e.g., Breslau, Davis, Adreski, & Peterson, 1991; Saxe et al., 1993) systematic investigation of what defines effective treatment is still in early stages of development. Most of the published treatment studies have utilized cognitive-behavioral therapy (CBT), eye movement

desensitization and reprocessing (EMDR) (see Appendix G); (e.g.; Wilson, Tinker, & Becker, 1995; Vaughn et al., 1994a; Vaughan, Wiese, Gold, & Tarrrier, 1994b), or pharmacotherapy. Unfortunately, general long-term outcomes fail to show robust decreases in PTSD symptoms (van der Kolk et al., 1996, pp. 418-419). What distinguishes people who develop PTSD from those who are merely temporarily stressed is that they become “stuck” on the trauma; they keep reliving it in thoughts, feelings, actions, or images which is responsible for the complex biobehavioral change that we call PTSD (McFarlane, 1988, p. 677). As described in the DSM-IV-TR (APA, 2000), PTSD is characterized by persistent re-experiencing of the traumatic event (intrusions), persistent avoidance of stimuli associated with the trauma, numbing of general responsiveness, and persistent symptoms of increased psychological arousal. People with PTSD have difficulty calming down or self-regulating, reflected in higher levels of sympathetic nervous system activation and lower heart rate variability, a marker of autonomic nervous system’s flexibility (Cohen et al., 1997; 1998; 1999).

PTSD has a debilitating negative impact on the quality of life of the individual (Warshaw, et al., 1993, p. 1512). Seventy-four percent of the people diagnosed with PTSD are symptomatic for more than six months and may experience symptoms for years (Breslau, 2001, p. 56). The U.S. National Co-morbidity Survey (Kessler et al., 1997, p. 4-16) found that approximately 88% of those with PTSD had a least one other co-occurring psychiatric illness around which these individuals begin to organize their lives in order to avoid re-experiencing problematic symptoms (van der Kolk et al, 1998, p. 419).

Avoidance, or adaptive behavior, may take many forms: keeping away from situations, people, or emotions that remind them of the traumatic event; consuming alcohol or drugs, which numb awareness of distressing emotional states; or utilizing dissociation to keep

unpleasant experiences from conscious awareness. A chronic sense of helplessness, physiological hyperarousal, and other changes may permanently change how a person deals with stress, alter his or her self-concept, and interfere with their world-view. . . . People with PTSD experience their internal world as a danger zone filled with trauma-related thoughts and feelings. . . . This avoidance of emotional triggers diminishes the importance of current reality, and, paradoxically, increases attachment to the past. (van der Kolk et al., 1998, p. 419)

### **Intrusive Re-experiencing and Autonomic Hyperarousal**

Remembrance and intrusions of trauma are expressed in many ways: as flashbacks, affective states, somatic sensations, nightmares, interpersonal reenactments, character styles, and pervasive life themes. The physiological responses of people with PTSD are conditioned to react to reminders of the trauma as an emergency. Autonomic arousal, serves as an essential function of alerting ourselves to potential danger. This ability loses its function in people with PTSD and becomes a trigger of stress reactions and therefore causes the person to mistrust their bodily sensations. This increased sense of anxiety may also become a trigger which precipitates reactions that are irrelevant to present demands (van der Kolk, 1998, p. 421).

### **Numbing of Responsiveness**

People with PTSD are often very aware of their difficulties controlling their emotions and often end up spending a lot of energy on avoiding distressing internal sensations and end up

having very little satisfaction in matters that previously gave them a sense of satisfaction and may feel “dead to the world”. This may be expressed as depression, lack of motivation, psychosomatic states, or as dissociative states. This emotional numbing often gets in the way of resolving the trauma in psychotherapy (van der Kolk, 1998, p. 422).

### **Intense Emotional Reactions**

The loss of neuromodulation is at the core of PTSD and leads to the loss of affect regulation. Traumatized people go immediately from stimulus to response without being able to first figure out what makes them upset. This makes them either overreact and intimidate others, or shut down and freeze. Both adults and children with these hyperarousal difficulties, experience sleep problems, both because they are unable to calm themselves and because they are fearful of having traumatic nightmares (van der Kolk, 1998, p. 422).

### **Learning Difficulties**

Physiological hyperarousal interferes with the ability to concentrate and to learn from experience. Traumatized people also have difficulty remembering ordinary events and are easily triggered. . . . They display symptoms of attention-deficit/hyper-activity disorder and in children, this may show up in difficulties with self-care such as feeding and toilet training; in adults, it is expressed as excessive dependence and in a loss of capacity to make thoughtful, autonomous decisions (van der Kolk, 1998, p. 422).

### **Memory Disturbances and Dissociation**

Chronically traumatized people, particularly children, may develop amnesic syndromes related to the traumatic event or organize whole personality fragments to cope (Putnam, 1989, p. 58). At the far end of this spectrum is the syndrome of dissociative identity disorder, formerly

called multiple personality disorder, which occurs in about 4% of psychiatric inpatients in the U.S. (Saxe et al., 1993, p. 1037).

### **Aggression against Self and Others**

Numerous studies have demonstrated that both adults and children who have been traumatized are likely to turn their aggression toward others or themselves. Abuse during childhood dramatically increases the risk for later delinquency and violent behavior. Self-mutilators invariably have been found to have histories of childhood abuse and/or neglect (van der Kolk, Perry, Herman, 1991). Problems with aggression against others have been particularly well documented in war veterans, in traumatized children, and in prisoners with histories of early trauma (Lewis, 1990, p. 125; 1992, p. 383).

### **Psychosomatic Reactions**

Chronic anxiety and emotional numbing are distractions from learning to identify and articulate internal states and desires (Krystal, 1978, p. 81; Pennekaker, 1993, p. 539). Many traumatized people suffer from the inability to translate somatic sensations into basic feelings, such as anger, happiness, or fear. This therefore interferes with the ability to describe feelings in words and is often expressed in terms of physical states such as a stomach ache or headache rather than in terms of psychological states (Saxe et al., 1994, p. 1329).

All of this makes it hard for people with PTSD to find pleasure in the present moment because their body keeps replaying the past. Neuroimaging studies of human beings in highly emotional states reveal that intense emotions such as anger, fear, or sadness, cause increased activity in brain regions related to fear and self-preservation and reduced activity in the brain

regions related to feeling fully present (Integral Yoga, 2009, p. 12). The challenge is to learn to tolerate feelings and sensations by increasing capacity for observing without judgment, a principle of meditation rather than running away by pushing others away or by numbing with drugs or alcohol or with gambling or with food or some other way to avoid feeling. Trauma-sensitive Yoga is a way for people with PTSD to safely feel their physical sensations and to develop a quiet practice of stillness (Integral Yoga, 2009, p. 12).

### **Articles Describing Four Studies**

Dr. Bessel van der Kolk, MD has published hundreds of articles describing study results related to PTSD symptoms. This particular article, Clinical implications of neuroscience research in PTSD, (van der Kolk, 2006), reviews research showing how exposure to extreme stress affects brain function. The evidence he describes suggests that traumatized people are vulnerable to react to sensory information with sub cortically initiated responses that are irrelevant, and often harmful, in the present moment. Reminders of traumatic experiences activate brain regions that support intense emotions, and decrease activation in the central nervous system which is involved in integrating sensory input with motor output, the regulation of physiological arousal and the ability to communicate experience in words. PTSD symptoms often interfere with attention and memory and cause disruption in the individual's ability to engage in the present moment. This article suggests effective treatments need to involve learning to tolerate feelings and sensations by increasing the capacity for interoception, learning to regulate arousal, and learning that after confrontation with physical helplessness it is essential to engage in taking effective action.

van der Kolk also cites the study Emerson et al., (2009) described following this summary. Neuroscience research has provided important new insights into processing of intense emotions.

The laboratories of Antonio Damasio have shown that living creatures respond less automatically to incoming sensory information with relatively stable neuronal and hormonal activation popularly known as the fight, flight, freeze response. MacLean (1990) defined this as the Triune Brain, previously described, which identifies humans unique in the animal kingdom because of our capacity to make choices about how to respond. This ability is the result of the property of the human neocortex to integrate a variety of information and attach meaning to both incoming information and the physical urges that these evoke as well as to apply logical thought and anticipate long-term consequences of our actions (p. 3). Emotions occur not by conscious choice but as part of the limbic brain. van der Kolk says a core clinical issue in treating PTSD is that traumatized individuals are prone to experience the present with physical sensations and emotions associated with the past (p. 4). For therapy to be effective it might be useful to focus on the patient's experience of their physical self rather than focusing on the meaning that they make of the experience. Interoceptive, body-oriented therapies can directly confront this challenge. Establishing trust is critical in helping the client discover a physical sense of control and exploring ways for regulating physiological arousal, in which the use of breath and body movement can be extremely helpful. Equally important are exploring previous experiences during which the person has felt safe and competent; and help them access memories of pleasure, enjoyment, focus, power, and effectiveness before activating trauma-related sensations and emotions. Working with trauma is as much about remembering how one survived as it is about what is broken (p. 13).

**Yoga therapy in practice: Trauma-sensitive Yoga: principles, practice, and research, (Emerson et al., 2009).**

The study described in this article was designed to examine the impact of the Yoga

Therapy program on PTSD symptoms conducted at the Trauma Center at the Justice Resource Institute in Brookline, Massachusetts. Dr. Bessel van der Kolk, M.D. founded the Center in 2003. The Center has been providing Yoga for a variety of trauma survivors, including war veterans, rape survivors, at-risk youth, and survivors of chronic childhood abuse and neglect. The goal of the study was to investigate the effectiveness of having trauma survivors participate in Yoga and compare the effects of group Yoga classes to a structured group-treatment intervention. The participants included 16 women ages 25-55 and were randomly assigned to either eight sessions of gentle 75-minute Hatha Yoga class or to a Dialectical Behavior Therapy (DBT) group (see Appendix G). Changes in symptoms were tracked through self-report inventories measuring severity of PTSD symptoms, positive and negative affect, and body awareness (Emerson, et al., 2009, p. 124).

After eight weeks, the Yoga participants showed improvements in all dimensions of PTSD, an increased positive affect and decrease in negative affect, and an increase in their physical vitality and body attunement (p. 124). Compared to the DBT participants, those who were involved with the Yoga program reported a greater reduction in frequency of all PTSD symptoms and severity of hyperarousal symptoms. Although the results of the study did not reach statistical significance due to the small sample size, Yoga appears to positively affect self-regulation and decrease hyperarousal. These positive changes may match or exceed those of the more commonly utilized DBT or Cognitive-Behavioral Therapy skills (see Appendix G).

These initial positive findings have encouraged the staff at The Trauma Center to continue investigating the effects of Yoga on heart rate variability among trauma survivors, and conducting larger randomized, single-blind, controlled study looking at the efficacy of Yoga

compared with a women's health awareness control group. This current study is looking at women with PTSD who have been treatment-resistant after several years of some type of PTSD intervention, such as traditional talk therapy. The Trauma Center is exploring whether Yoga can improve PTSD symptoms, reduce multiple somatic complaints, social and occupational impairment, and reduce high healthcare utilization that has already been documented among hundreds of thousands of female trauma survivors in the U.S.

These findings confirmed important details for facilitating trauma-sensitive Yoga practice. The Trauma Center's Yoga Program is offered in several different environments with the goal being to make each environment as welcoming as possible for trauma survivors. The primary concern is to provide a space where the participants feel safe and less vulnerable. The following details were outlined:

- Providing an atmosphere of safety
- If there are windows exposed to the public, cover them.
- Lighting is soft but not too dark
- Mirrors can be an unhelpful distraction. There may be mirrors present, but can be arranged so that participants don't have to face them.
- Minimize external noise.
- Assure the privacy of the room by making sure no one will be walking in and out of the room inadvertently during class.
- Include enough props for everyone including chairs for chair-based work.

### **The Exercises**

A typical Trauma Center Yoga class begins with a seated centering series of warm-ups

including gentle neck stretches and shoulder rolls. The purpose for the teacher during the opening of the class is to set the tone of safety, gentleness, and non-judgmental self-study. The longest portion of the class includes typical Yoga postures. Depending on the population of the class, young Marines recently returned from Iraq to older survivors of chronic childhood abuse and/or neglect, the postures will vary. Strength-oriented postures are most likely to be selected for the young and fit and more gentle postures for students who are less physically active. The ending of the class will also vary according to the population. If folks are comfortable lying down on the floor and closing their eyes, *savasana* (relaxation pose) might be used. If group members are hypervigilant or hyperaroused, a seated resting posture might be a better choice. In every class, emphasis is always put on having choices and self-selecting to choose which postures to do or not. The intention with emphasizing individual choices in the class is for the students to know and feel they have control over their experience and to encourage each person to find what is most helpful and restful for them.

The primary consistent theme in trauma-sensitive Yoga is the instruction including statements: “If this is uncomfortable to you for any reason, you can always come out of the posture and come back to your mindful breathing.” The intention of this statement is to teach trauma survivors to identify what is happening in the moment with their bodies. The ability to notice pain or discomfort on any level and the ability to verbalize “No, I will not be in pain. My opinion about what is happening to me matters, and I can take control” (Emerson et al., p. 125). These moments are the therapeutic moments in class.

Emerson and his colleagues comment that their experience teaching Trauma-Sensitive Yoga is more about the “how” than the “what” (p. 125). Some postures, particularly hip openers, have

been challenging for many trauma survivors. Hip openers can be very important postures and require preparation prior to being taught; for example, starting with seated poses like *jana sirsanasana* (head-to-knee pose) and to progress to *baddha konasana* (bound-angle pose) (see Appendix J) and, if the student is comfortable advancing to another progression of these postures continue to introduce, over a series of classes rather than in a single class, supine (lying on the floor) knees-to-chest, one leg at a time at first. The teacher always emphasizes the student is in control over what they are doing with their body, by reminding them with the statement “If this is uncomfortable for any reason, you may choose to come out of the pose and return to your mindful breathing” (p. 126).

### **Yoga Teacher Qualities**

The Trauma Center Yoga program defines the trauma-sensitive Yoga teacher as one who is present and positive; one who is engaged, welcoming, and approachable; one who is very competent and at ease with the Yoga material, but invites feedback and is willing to listen; and most importantly, one who makes changes when things are not working (p. 126). The trauma-sensitive teacher can be directive but also invites students to have their own experience; “Try lifting your arms up, and if that is uncomfortable for any reason, you may bring your arms back to your sides” (p. 126). Problems arise when the teacher tries to be a trauma expert or tries to control the experience for the student by making statements like, “This posture is difficult for trauma survivors,” or “This posture should feel really good” (p. 126).

Trauma Center has provided the following recommendations for how teachers can help students feel comfortable:

- Dress conservatively to minimize distraction.
- Be in the room before anyone arrives if possible, and acknowledge each student’s

entrance with a verbal “welcome”.

- Make it easy for students to know where you are at any point during the class; don’t move around a lot.
- Demonstrate a welcoming and accepting attitude throughout the class; smiling, keeping things light, rather than being strict and critical.
- Consider the pace of instruction. A slow pace works better than a rapid pace.

Remember we are teaching folks to take some time with their bodies, and we don’t want to rush them through it. Aim for a balanced rhythm for transitions from one pose to another to maintain a sense of time without too much lingering to dissociate or drift off.

### **Physical and Verbal Assists**

For many trauma survivors, physical assists are a clinical issue and should be treated with great care and attention (p. 126). The Trauma Center does not offer physical assists for the first several months of an open Yoga class and suggests not doing assists at all if the class is only a few weeks long. Verbal assists can be very valuable and will demonstrate that the teacher is attentive to the student’s individual posture. Suggesting the use of a block or a blanket to make a posture more accessible can be very helpful. The authors comment that they have found offering physical assists in some of their long-term classes have provided therapeutic value such as helping people tolerate nurturing, positive touch from another. However, they also point out that their primary goal in helping survivors of trauma is to help these folks develop self-knowledge and friendliness toward their own bodies and that after some time, physical assists might serve these ends, but not necessarily.

### **Language**

The Trauma Center Yoga program emphasizes what the Yoga teacher says and how it is

said

is of the utmost importance. Trauma-sensitive Yoga is not about getting students to do something but more about inviting them to try something which is done through Invitatory Language (p. 126). This involves phrases such as “when you are ready,” “if you like,” “as you like.” Students are invited to try, not required, coerced, or pushed. Value is placed on being willing to listen to their own bodies and acting accordingly. Instructions are clear and simple with effort to invite rather than command; “Stand up tall,” and “If you like, try standing up tall.” Invitatory Language supports the primary clinical goal of helping trauma survivors develop a friendly, not demanding, gentle relationship with their bodies (p. 127). Trauma survivors tend to have a deeply antagonistic relationship with the body (Cohen et al., 1998). For some trauma survivors, becoming friendly with the body might start with not utterly hating it. Trauma survivors typically feel deeply alienated from society (Harman, 2003, p. 43). Trauma-sensitive Yoga teachers need to be prepared to help people wherever they are at in the process (Emerson et al, 2009, p. 127).

### **iRest: Integrative Restorative Yoga at Walter Reed Army Medical Center**

In 2006, Yoga was introduced as part of a feasibility study at the Walter Reed Army Medical Center in Washington, D.C. The results indicated that a particular approach of Yoga had a positive effect on military personnel suffering from post traumatic stress disorder (PTSD). The study, funded by the Samuels Foundation, a private grant-making institution, used a protocol of Yoga Nidra meditation to examine its effect on U.S. active-duty soldiers who were experiencing PTSD from their experiences in the Afghanistan and Iraq war zones. Yoga Nidra, or Yogic

sleep, is one of the four states of mind described in the Yoga Sutras (see Appendix D). It's not sleep as we traditionally know it, but rather a state of conscious sleep used for deep relaxation. A total of seven men and women participated in the nine-week study including 18 classes and a daily home practice using compact disks provided by the instructor. Changes in health status such as anxiety, depression, insomnia, pain and locus of control were assessed over the course of the study using pre-, post- and follow-up data. An additional goal of the study was to gather preliminary data on the anticipated effect, size and feasibility of doing a larger clinical study on the adjunctive use of Yoga for the treatment of PTSD symptoms in enlisted military personnel.

Due to the excellent trends that came from this study, in 2008, the Samueli Foundation funded a 200-subject, multi-site, in-depth research study using Yoga Nidra with active-duty soldiers experiencing PTSD. This study is currently in process at various Veteran Administration sites around the U.S. and results are not yet published (Pollack, 2010, p. 76). The lead consultant for the initial study was Richard Miller, a clinical psychologist, Yoga teacher, and president of the Integrative Restoration Institute in San Rafael, California. Since the 2006 feasibility study, Miller has developed a protocol named Integrative Restoration or iRest for the military based on the techniques of Yoga Nidra, which is in current use at Walter Reed Army Medical Center, in Washington, DC; the Miami and Chicago VA hospitals; and Camp Lejeune in North Carolina.

Miller's program is a 35-minute guided meditation, initially learned lying down, and then integrated into all body positions. It incorporates "breath awareness" and "body sensing" by asking participants to observe their emotions, thoughts, and memories from an objective distance. It introduces the Yogic concept of the "observing self", something beyond body,

mind,  
and spirit that never changes, regardless of thoughts, emotions, or experiences. This is referred to as *purusha* in traditional Yoga terminology of the Sanskrit language. Miller found that the use of this terminology often created a barrier in the classes and has since minimized the use of unfamiliar terms. He renamed this practice "integrative restoration," or iRest which is now available as a manualized program across the country (Pollack, 2010, p. 106).

Three iRest trained Yoga teachers describe their observations of the classes they are teaching in the article Expanding the embrace: Yoga and meditation as adjunct healing methods for service members (2010). These ongoing classes are part of three different military settings using the iRest program; the War-Related Illnesses and Injuries Study Center at the Veteran Hospital in Washington, D.C.; the multidisciplinary PTSD treatment program called the Specialized Care Program for active-duty service members at Walter Reed Army Medical Center; and the Miami Veteran's Administration Inpatient PTSD and Substance Abuse programs and the acute psychological care unit (Carnes et al., 2010, p.1). The instructors of these classes state;

Our jobs within the military and VA give us the opportunity to witness the integration of Yoga and meditation with both active-duty service members and veterans who suffer from PTSD and other physical and psychological challenges. Despite some initial skepticism and resistance, the positive changes exhibited by the participants and their interest in these programs have propelled their growth. After just a few sessions, many participants report

experiencing more restful sleep, alleviation of physical pain (much of which is combat-related), and an improved ability to modulate strong emotions. Over time, many participants

have cut back on their medications as a result of their practice. Enrollment in the programs is

on the rise, and retention rates remain extremely high. Many individuals have developed their

own home practice . . . they are developing self-care habits . . . independent of medical practitioners and shared with family and friends. . . . The structure and consistency of the class routine offers comforting stability after the chaos of battle. The inward focus and the repetitive process allows for gradual integration. . . . The unspoken shared intent of those voluntarily gathered to practice is a reminder that we are not alone in our quest for wholeness.

. . . After all, the Sanskrit word “Yoga” means “to yoke,” to bring together or unite. Yoga is

really about bringing wholeness where there was fragmentation and fostering the process of integration, an essential part of healing the shattering experiences of war. (Carnes et al.,

2010,

p. 1)

### **Yoga Warriors Program**

In 2004, Central Massachusetts Yoga and Wellness in West Boylston initiated a program called Yoga Warriors. It is designed to help veterans who suffer from post traumatic stress Disorder (PTSD). The details described here were collected from the Yoga Warriors (YW)

website and during a sixteen-hour YW Teacher training this writer attended September 11 and 12, 2010 with the developers Lucy Cimini, Founder and President of the Central Mass Yoga and Wellness, Inc. and Lynn Stoller, Co-developer, occupational therapist consultant and research coordinator for the YW Program. Acceptance into the 16-hour Yoga Warriors (YW) Teacher training requires a minimum of 200-hour Yoga Teacher Registration. This means that the teacher has successfully completed the national standard of protocol established by Yoga Alliance (2010) Board of Yoga practice. The ninety page YW manual include research-based evidence for the selected Yoga practices with detailed instruction. The specific details of the YW research outcomes are expected to be published in 2011. Therefore, as of the date of the writing of this review, the full details of their study are not included in this review. During the introduction of the YK teacher training, Lynn Stoller and Lucy Cimini explained:

the program incorporates principles and techniques from sensory integration theory and neurorehabilitation practice to reduce symptoms of combat stress or PTSD. Sessions are designed to provided enhanced proprioceptive (muscle) input, deep touch pressure, some slow  
rhythmical movement, carefully selected pranayama (breathing), (see Appendices H and I) techniques that promote calming, and a series of asanas (postures) to balance the nervous system toward a more relaxed and steady state. (YW, Sept., 2010)

Positive affirmations are also incorporated as a cognitive-behavioral technique to strengthen positive thought, attitude, and promote health and well-being.

The name of their research study is *The Effect of Yoga on Symptoms of Combat Stress in Active-Duty Military Personnel* and was successfully implemented in October 2009. The study was approved by the USAISR and the IRB at Brooke Army Medical Center at Fort Sam

Houston, San Antonio, Texas. Currently, this is the largest randomized, experimental/control group, pre-test/post-test study of Yoga using an active duty military population and the first Yoga study ever conducted in a deployed environment. The method of the study included seventy deployed U.S. military personnel stationed in Kirkuk, Iraq, who participated in a computer randomized controlled trial; thirty-five subjects were assigned to three weeks of a minimum of nine 90-minute YW sessions at least twice a week (Cimini & Stoller, 2010, p. 3).

Air Force Major Jon Greuel, completed his tour of duty in Iraq in November 2009 and served as the Principal Investigator and is a certified Yoga instructor. He taught Yoga to active duty military personnel during his off-duty hours. While officially "on duty", Major Greuel instructed Iraqis in primary and instrument flying. The purpose of the study, is to help military troops develop proactive traumatic stress management to avoid developing post-traumatic stress disorder. Greuel believes there is an ethical imperative to develop effective strategies to enable our troops to transition more easily from "battle-ready" in preparation or response to a threat, back to a normal state of arousal once the requirement for vigilance has passed (YW, Sept., 2010).

The YW mission statement: provide evidence-based sensory enhanced Hatha Yoga methodology to prevent or alleviate symptoms of combat stress (COSR) or post traumatic stress disorder (Cimini & Stoller, 2010, p. 4). During the YW Teacher training, Lynn Stoller stated their ultimate goal is to see the YW program made available to all military personnel for free. Lynn Stoller described the results of their protocol are effective in reducing state and trait anxiety, despite typical performance at baseline. Treatment subjects showed more

improvement on 16 out of 18 mental health and quality of life factors as compared to the control group. The quality of life factors were developed by the YW research team and will be available when the study results are published. The YW research team provided operational definitions of the following terminology:

- Sensory sensitivity: represents behaviors in accordance with a low neurological threshold.
- Distractibility: difficulty screening stimuli, and discomfort with sensation (Brown et al., 2001, p. 76).
- Sensation avoiding: counteracting a low neurological threshold, sensation avoiding includes behaviors that limit exposure to stimuli (Brown et al., 2001, p. 76).
- Low registration: reflects responses in accordance with a high neurological threshold. This quadrant includes a disregard of or slow response to sensation (Brown et al., 2001, p. 76).
- Sensation seeking: a counteractive response to high neurological threshold and encompasses pleasure derived from rich sensory environments and behaviors that create sensation (Brown et al., 2001, p. 77).
- State anxiety: reflects a transitory emotional state or condition of the human organism that is characterized by subjective, consciously perceived feelings of tension and apprehension, and heightened autonomic nervous system activity. This may fluctuate over time and can vary in intensity. (NOVA, 2009)
- Trait anxiety: denotes relatively stable individual differences in anxiety proneness . . . and refers to a general tendency to respond with anxiety to perceived threats in the environment. (NOVA, 2009)

## Conclusions

The research presented in this literature review identify body-based techniques of specific Yoga practices as promising treatments for trauma-related symptoms and PTSD. Although long-term, randomized studies with large cohorts and a control group have yet to be completed on these emerging practices. However, current research-based evidence indicates that Yoga practices that teach breath control and ability to observe rather than judge are effective for reducing physical and emotional symptoms associated with PTSD. Additionally, consensus among these findings (see Appendix K) indicate many details are involved in creating an effective atmosphere for these practices including but not limited to: soft lighting, secured privacy, minimal distractions, as well as characteristics of the Yoga Teacher including competent standardized skills with a compassionate and non-judgmental attitude and commitment to ethical standards of practice.

The scientific evidence for understanding the complexities of trauma-related illnesses and disorders provide insight into understanding how mind-body based alternative and complementary therapies such Yoga are viable treatment and prevention methods. This work is an emergent area of study. The applications of trauma-sensitive Yoga practice in other populations is not fully represented in this paper, i.e.; prenatal care, infant mental health, children, and youth, and require further exploration. Established rehabilitation treatment concepts for occupational therapists, particularly with regard to understanding how to treat symptoms associated with limbic system functioning and affect regulation offer compatible adjunctive research and treatment opportunities. This contributes to the development of an integrative conceptual framework including an entirely different way of viewing all kinds of individuals, social misbehaviors, and maladaptations, moving from viewing people as “sick” or

“bad” or both to injured (Bloom, 2010). The proposed new DSM criteria, Developmental Trauma Disorder, reflects this paradigm shift within the field of psychiatry and medicine as well as addresses the validity of comprehensive early interventions and services including infant mental health and pre-natal care. Bruce Perry (2006) suggests guiding interventions and treatment based on a neurosequential model of therapeutics for infants, young children, and youth. This is another example of the shift from viewing behavior through a pathological lense toward viewing behavior as a functional map of the child’s needs. Blaustein and Kinniburgh (2010) describe similar concepts in the ARC model (Attachment, Self-regulation, and Competency) and utilize somatosensory activities (mind-body based exercises) similar to that of trauma-sensitive Yoga practices. All of this reflects a growing body of research and evidence-based practices that are contributing to the paradigm shift previously described (Bloom, 2010).

The 2003 President’s New Freedom Commission on Mental Health Final Report reflects these advances by calling for a transformation of the U.S. mental health system by building systems that are evidence-based, recovery-driven, and consumer-and-family driven (p. 1). The financial investment of our government, as described in the introduction of this paper, in supporting research into alternative and complementary therapies is encouraging. However, advocacy within our health care system and regulations regarding access to effective treatments require equal attention as well as provide evidence of the importance for collaboration among clinicians and researchers in order to develop relevant treatment protocols with lasting effect.

*Start by doing what's necessary,  
then do what is possible,  
and suddenly,  
you are doing the impossible.*

-- Saint Francis of Assisi

(see Appendix L)

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### **Appendix A: Mahesh and Vivekandanda**

Mahesh, M. (Hindi: महर्षि महेश योगी) born Mahesh Prasad Varma (January 12, 1914 died

February 5, 2008 in Vlodrop, Netherlands) introduced the Transcendental Meditation technique 40 years ago. Retrieved from <http://www.maharishi.org/>

Swami Vivekananda (Bengali: স্বামী বিবেকানন্দ, *Shami Bibekānondo*) (January 12, 1863–July

4, 1902), born Narendranath Dutta was the chief disciple of the 19th century mystic

Sri Ramakrishna Paramahansa and the founder of Ramakrishna Mission. He is considered a

key figure in the introduction of Hindu philosophies of Vedanta and Yoga in Europe and

America and is also credited with raising interfaith awareness, bringing Hinduism to the

status of a world religion during the end of the 19th century. Vivekananda is considered to

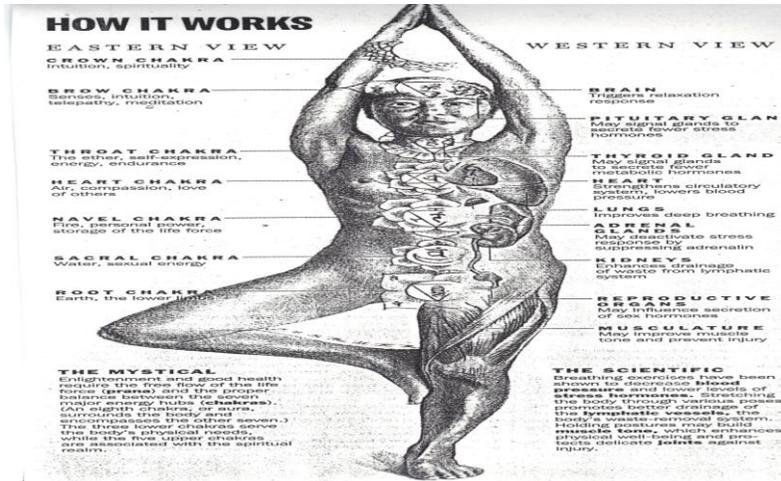
be a major force in the revival of Hinduism in modern India. He is best known for his

inspiring speech beginning with "Sisters and Brothers of America", through which he

introduced Hinduism at the Parliament of the World's Religions at Chicago in 1893.

Retrieved from [http://Swami\\_Vivekananda](http://Swami_Vivekananda)

Appendix B: Eastern and Western Perspectives; How it works



Time. April 23, 2001 (p. 63)

### **Appendix C: The Language and History of Yoga**

In 1893, Yoga was introduced to the United States at the parliament of World Religions in Chicago by Swami Vivekananda (2010). It is believed that the sage Patanjali is the first person to have recorded the systematic processes of Yoga approximately 200 years prior to the birth of Christ. Patanjali's text is known as the Yoga Sutra. The word Yoga comes from the Sanskrit language and means "to join" or "yoke". This is one of the oldest languages known for over thousands of years and Sanskrit literature is the richest literature in the history of humankind. Sanskrit is one of the official languages of India and is popularly known as a classical language of the country. In this culture, it is considered as the mother of all languages. It belongs to the Indic group of language family of Indo-European and its descendents which are Indo-Iranian & Indo Aryan. It is also a language of Hinduism, Buddhism, and Jainism. Sanskrit is now attracting the modern world. Today, around 49,736 of the population speak the Sanskrit language fluently, according to the 1991 Indian census. Many Buddhist scholars of Japan, China, and Thailand use Sanskrit language apart from India, Sri Lanka, Bangladesh, Nepal, some areas of south and Southeast Asia. The language is also known for its clarity and beauty. This is the only language that is used in holy functions and ceremonies of Hindus, as it has always been regarded as the sacred language of the religion. Sanskrit mantras, when recited in combination with the sound vibration, have a specific effect on the mind and the psyche of the individual (Nagarathna, 2010).

### Appendix D: The Yoga Sutras

Patanjali defines Yoga as mastery over the modifications of mind. There are four techniques of Yoga to achieve this calm state of mind. These are Jnana Yoga - the path of self analysis, Raja Yoga - the path of self control, Bhakti Yoga - the path of self surrender and Karma Yoga - the path of self sacrifice. There are four major areas of applications of yoga in medicine; complementary therapy, prevention, rehabilitation and promotion of positive health.

The Raja Yoga also called Asthanga Yoga has eight limbs (components);

- 1) **Yama:** Don'ts-- Moral restraints: non-violence, truthfulness, non-stealing, celibacy, non-acceptance of gifts
- 2) **Niyama:** Do's-- Moral commitments: cleanliness, cheerfulness, penance, self study, and surrender to God
- 3) **Asana:** Physical Postures (most popularized in the U.S.)
- 4) **Pranayama:** Slowing down or controlling the breath
- 5) **Pratyahara:** Withdrawal of the senses from sense objects
- 6) **Dharma:** Meditation
- 7) **Dhyana:** Restful alertness
- 8) **Samadhi:** Absorption with object of meditation (enlightenment)

(Nagarathna, 2010)

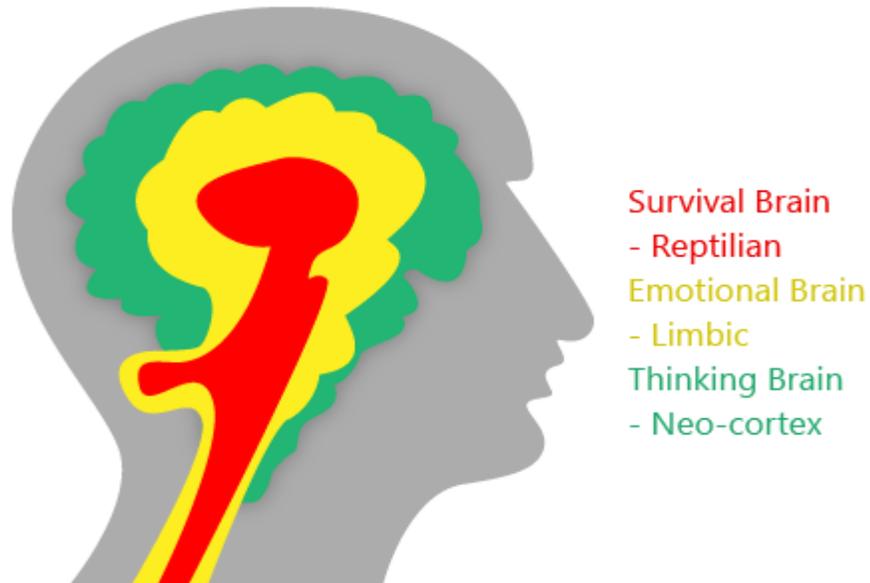
### Appendix E: Types of Yoga

The publication *Light on Yoga* (1966) by B.K.S. Iyengar is considered the modern “bible” of Yoga and includes over 600 detailed photographs of postures and sequences. Today, some of the popular styles of Yoga in the United States are;

- **Iyengar**- this practice focuses on careful alignment using straps and blocks or pillows to support poses in such a way to make them more accessible to students who may not be very flexible.
- **Kripalu**- students learn to focus on their physical and psychological reaction to various postures.
- **Kundalini**- this practice involves classic stretching postures and breathing exercises coordinated with chanting and meditation.
- **Viniyoga**- this is the most highly customized form of Yoga. Function is stressed over form with emphasis on integrating the flow of the breath with the movement of the spine.
- **Sivananda**-this is one of the world’s largest schools of Yoga and encompasses total lifestyle adjustment to vegetarian diet and study of the Yoga scriptures.
- **Ashtanga**-also known as “power Yoga” includes jumping from one pose to another with focus on building strength, stamina and flexibility.
- **Jivamukti**-this is a variation of Ashtanga with emphasis on spiritual training including chanting, meditation, and readings.
- **Bikram or Choudhury (Hot Yoga)**- this is often practiced in a heated room of up to 100 degrees F with focus on stretching.

## Appendix F: Triune Brain

### Triune Brain



Retrieved from <http://storylinkstraining.co.uk/wp-content/uploads/triunebrain.gif>

MacLean suggests that the human brain is actually three brains in one. Each of the layers or "brains" were established successively in response to evolutionary need. The three layers are the reptilian system, or *R-complex*, the *limbic system*, and the *neocortex*. Each layer is geared toward separate functions of the brain, but all three layers interact substantially (Caine et al., 1990)..

#### **The Reptilian Complex**

The R-complex consists of the brain stem and the cerebellum. Its purpose is closely related to actual physical survival and maintenance of the body. The cerebellum orchestrates movement. Digestion, reproduction, circulation, breathing, and the execution of the "fight or flight" response in stress are all housed in the brain stem. Because the reptilian brain is primarily concerned with physical survival, the behaviors it governs have much in common with the survival behaviors of animals (Caine et al., 1990).

## **The Limbic System**

The limbic system houses the primary centers of emotion. It includes the amygdala, which is important in the association of events with emotion, and the hippocampus, which is active in converting information into long term memory and in memory recall. Repeated use of specialized nerve networks in the hippocampus enhances memory storage, so this structure is involved in learning from both commonplace experiences and deliberate study. Because the limbic system links emotions with behavior, it serves to inhibit the R-complex and its preference for ritualistic, habitual ways of responding. The limbic system is also involved in primal activities related to food and sex, particularly having to do with our sense of smell and bonding needs, and activities related to expression and mediation of emotions and feelings, including emotions linked to attachment. These protective, loving feelings become increasingly complex as the limbic system and the neocortex link up.

## **The Neocortex**

Also called the cerebral cortex, the neocortex constitutes five-sixths of the human brain. It is the outer portion of our brain, and is approximately the size of a newspaper page crumpled together. The neocortex makes language, including speech and writing possible. It renders logical and formal operational thinking possible and allows us to see ahead and plan for the future. The neocortex also contains two specialized regions, one dedicated to voluntary movement and one to processing sensory information.

The layers are connected by an extensive two-way network of nerves. On-going communication between the neocortex and the limbic system links thinking and emotions; each influences the other and both direct all voluntary action. This interplay of memory and emotion, thought and action is the foundation of a person's individuality (Caine et al., 1990).

Retrieved from <http://storylinkstraining.co.uk/wp-content/uploads/triunebrain.gif>

### **Appendix G: EMDR, DBT, and CBT**

Eye Movement Desensitization and Reprocessing (EMDR) is a comprehensive, integrative psychotherapy approach. It contains elements of many effective psychotherapies in structured protocols that are designed to maximize treatment effects. These include psychodynamic, cognitive behavioral, interpersonal, experiential, and body-centered therapies (Shapiro, 2002, p. 14).

EMDR psychotherapy is an information processing therapy and uses an eight phase approach to address the experiential contributors of a wide range of pathologies. It attends to the past experiences that have set the groundwork for pathology, the current situations that trigger dysfunctional emotions, beliefs and sensations, and the positive experience needed to enhance future adaptive behaviors and mental health.

During treatment various procedures and protocols are used to address the entire clinical picture. One of the procedural elements is "dual stimulation" using either bilateral eye movements, tones or taps. During the reprocessing phases the client attends momentarily to past memories, present triggers, or anticipated future experiences while simultaneously focusing on a set of external stimulus. During that time, clients generally experience the emergence of insight, changes in memories, or new associations. The clinician assists the client to focus on appropriate material before initiation of each subsequent set (Shapiro, 2001, p. 32).

**Dialectical behavior therapy (DBT)** was developed by Marsh Linehan, Ph.D. for the purpose of treating borderline personality disorder. DBT combines standard cognitive-behavioral techniques for emotion regulation and reality-testing with concepts of distress tolerance, acceptance, and mindful awareness. Research indicates that DBT is also effective in treating patients who present varied symptoms and behaviors associated with

spectrum mood disorders, including self-injury (Linehan et al., 1991). Recent work suggests its effectiveness with sexual abuse survivors and chemical dependency (Decker et al., 2008).

DBT is based on four components including specific skill development in each;

- Mindfulness
- Distress Tolerance
- Emotion Regulation
- Interpersonal Effectiveness

**Cognitive behavioral therapy (CBT)** was primarily developed through a merging of behavior therapy with cognitive therapy. It is an evidence-based psychotherapeutic approach utilizing talking therapy that aims to solve problems concerning dysfunctional emotions, behaviors and cognitions through a goal-oriented, systematic procedure. While rooted in rather different theories, these two traditions found common ground in focusing on the "here and now", and on alleviating symptoms. CBT is used in individual therapy as well as group settings, and the techniques are often adapted for self-help applications. CBT is effective for the treatment of a variety of problems, including mood, anxiety, personality, eating, substance abuse, and psychotic disorders. Treatment is often manualized, with specific technique-driven brief, direct, and time-limited treatments tailored to specific psychological disorders (Butler et al., 2006).

### **Appendix H: Asanas and Pranayama**

The word asana is the Sanskrit word meaning posture. Most Yoga postures are modeled after nature, i.e.; Mountain Posture also called Tadasana in Sanskrit. “Tada” means Mountain and “asana” means Posture. There are many postures that are named after man-made objects such as Plow Pose also called “Halasana”. Pranayama is a Sanskrit word meaning restraint of the prana or breath. The word is composed of two Sanskrit words, Prāna, life force, or vital energy, particularly, the breath, and "āyāma", to suspend or restrain. It is often translated as control of the life force (prana).

Breathing is so simple and so obvious we often take it for granted, ignoring the power it has to

affect body, mind and spirit. With each inhale we bring oxygen into the body and spark the transformation of nutrients into fuel. Each exhale purges the body of carbon dioxide, a toxic waste. Breathing also affects our state of mind. It can make us excited or calm, tense or relaxed.

It can make our thinking confused or clear. What's more, in the Yogic tradition, air is the primary source of prana or life force. Pranayama is used in Yoga as a separate practice to help clear and calm the mind and body.

## **Appendix I: Examples of Pranayama Exercises**

Our breath is the source of prana or life force. Pranayama is used in Yoga as a separate practice to help clear and cleanse the body and mind. It is also used in preparation for meditation, and in asana, the practice of postures, to help maximize the benefits of the practice, and focus the mind. Below are several of the most commonly used forms of pranayama as described in Dr. Timothy McCall's publication *Yoga as Medicine* (2007).

- **Ujjayi** is often called the "sounding" breath or "ocean sounding" breath, and somewhat irreverently as the "Darth Vader" breath. It involves constricting the back of the throat while breathing to create an "ah" sound -- thus the various "sounding" names. (p. 421)

### **Benefits**

- Focuses the mind
- Increases mindfulness
- Generates internal heat

### **How to do it**

1. Come into a comfortable seated position with your spine erect, or lie down on your back. Begin taking long, slow, and deep breaths through the nostrils.
2. Allow the breath to be gentle and relaxed as you slightly contract the back of your throat creating a steady hissing sound as you breathe in and out. The sound need not be forced, but it should be loud enough so that if someone came close to you they would hear it.
3. Lengthen the inhalation and the exhalation as much as possible without creating tension anywhere in your body, and allow the sound of the breath to be continuous and smooth. To help create the proper "ah" sound, hold your hand up to your mouth and exhale as if trying to fog a mirror. Inhale the same way. Notice how you constrict the back of the

throat to create the fog effect. Now close your mouth and do the same thing while breathing through the nose.

### **When to do it**

During asana practice

Before meditation

Anytime you want to concentrate

- **Dheerga Svasam “Three-part Breathing”** (p. 352) is known as the "complete" or "three-part" breath, dirgha pranayama teaches how to fill the three chambers of the lungs, beginning with the lower lungs, then moving up through the thoracic region and into the clavicle region.

### **Benefits**

Promotes proper diaphragmatic breathing, relaxes the mind and body, oxygenates the blood, and purges the lungs of residual carbon dioxide.

### **How to do it**

Sit with your spine erect, or lie down on your back. Begin taking long, slow, and deep breaths through the nostrils.

1. As you inhale, allow the belly to fill with air, drawing air deep into the lower lungs. As you exhale, allow the belly to deflate like a balloon. Repeat several times, keeping the breath smooth and relaxed, and never straining. Repeat several times.
2. Breathe into your belly as in Step #1, but also expand the mid-chest region by allowing the rib cage to open outward to the sides. Exhale and repeat several times.
3. Follow steps #1 and #2 and continue inhaling by opening the clavicle region or upper chest. Exhale and repeat.

4. Combine all three steps into one continuous or complete flow.

### **When to do it**

During asana practice

Prior to meditation

Anytime you feel like it

- **Nadi Shuddhi**, or the sweet breath (also called alternate nostril breathing) is simple form of alternate nostril breathing suitable for beginning and advanced students. Nadi means channel and refers to the energy pathways through which prana flows. Shodhana means cleansing -- so Nadi Shodhana means channel cleaning. (p. 353)

### **Benefits**

Calms the mind, soothes anxiety and stress, balances left and right hemispheres, promotes clear thinking

### **How to do it**

- Hold your right hand up and curl your index and middle fingers toward your palm. Place your thumb next to your right nostril and your ring finger and pinky by your left. Close the left nostril by pressing gently against it source of prana or life force. Pranayama is used in yoga as a separate practice to help clear and with your ring finger and pinky, and inhale through the right nostril. The breath should be slow, steady and full.
  - Now close the right nostril by pressing gently against it with your thumb, and open your left nostril by relaxing your ring finger and pinky and exhale fully with a slow and steady breath.
  - Inhale through the left nostril, close it, and then exhale through the right nostril.
- That's one complete round of Nadi Shodhana --
- Inhale through the right nostril

- Exhale through the left
- Inhale through the left
- Exhale through the right.

Begin with 5-10 rounds and add more as you feel ready. Remember to keep your breathing slow, easy and full.

**When to do it**

Just about any time and any where. Try it as a mental warm-up before meditation to help calm the mind and put you in the mood. You can also do it as part of your centering before beginning an asana or posture routine. Also try it at times throughout the day. Nadi Shodhana helps control stress and anxiety. If you start to feel stressed out, 10 or so rounds will help calm you down. It also helps soothe anxiety caused by flying and other fearful or stressful situations.

## Appendix J: Asanas from Emerson et al article

### Knee to head forward bend: Janu Sirsasana (*JAH-new shear-SHAHS-anna*)

*janu* = knee

*sirsa* = head



MARTIN SCONDUTO

### Step by Step

Sit on the floor with your buttocks lifted on a folded blanket and your legs straight in front of you. Inhale, bend your right knee, and draw the heel back toward your perineum. Rest your right foot sole lightly against your inner left thigh, and lay the outer right leg on the floor, with the shin at a right angle to the left leg (if your right knee doesn't rest comfortably on the floor, support it with a folded blanket).

Press your right hand against the inner right groin, where the thigh joins the pelvis, and your left hand on the floor beside the hip. Exhale and turn the torso slightly to the left, lifting the torso as you push down on and ground the inner right thigh. Line up your navel with the middle of the left thigh. You can just stay here, using a strap to help you lengthen the spine evenly, grounding through the sitting bones.

Or, when you are ready, you can drop the strap and reach out with your right hand to take

the inner left foot, thumb on the sole. Inhale and lift the front torso, pressing the top of the left thigh into the floor and extending actively through the left heel. Use the pressure of the left hand on the floor to increase the twist to the left. Then reach your left hand to the outside of the foot.

With the arms fully extended, lengthen the front torso from the pubis to the top of the sternum. Exhale and extend forward from the groins, not the hips. Be sure not to pull yourself forcefully into the forward bend, hunching the back and shortening the front torso.

As you descend, bend your elbows out to the sides and lift them away from the floor. Lengthen forward into a comfortable stretch. The lower belly should touch the thighs first, the head last. Stay in the pose anywhere from 1 to 3 minutes. Come up with an inhalation and repeat the instructions with the legs reversed for the same length

## **Benefits**

- Calms the brain and helps relieve mild depression
- Stretches the spine, shoulders, hamstrings, and groins
- Stimulates the liver and kidneys
- Improves digestion
- Helps relieve the symptoms of menopause
- Relieves anxiety, fatigue, headache, menstrual discomfort
- Therapeutic for high blood pressure, insomnia, and sinusitis
- Strengthens the back muscles during pregnancy (up to second trimester)

## **Contraindications and Cautions**

- Asthma
- Diarrhea

- Knee injury: Don't flex the injured knee completely and support it on a folded blanket.

### **Beginner's Tip**

Make sure the bent-leg foot doesn't slide under the straight leg. You should be able to look down and see the sole of the foot. Keep the bent-leg foot active too. Broaden the top of the foot on the floor and press the heel toward the inner groin of the straight leg.

### **Modifications and Props**

If you can't comfortably reach the extended-leg foot, use a strap. Loop it around the sole of the foot and hold it with your arms fully extended. Be sure not to pull yourself forward when using the strap; walk your hands lightly along the strap while you keep your arms and the front of your torso lengthened.

### **Variation**

In some schools of yoga this pose is also performed with the perineum sitting on the bent-knee heel. The bent-knee leg is angled out to the side at somewhat less than 90 degrees.

### **Partnering**

A partner can help you learn about grounding the bent-leg thigh. Have your partner stand behind you and press the inner edge of his/her foot against the inner groin of your bent leg. As you lengthen forward into the pose, see if you can release the head of the thigh away from the pressure of the foot, toward the floor.

### **Follow-Up Poses**

- Seated forward bends

### **Deepen The Pose**

You can increase the challenge in this pose by widening the angle between the two legs past 90

degrees. Instead of bringing the bent-knee heel into the perineum, snug it into the same-side groin. Do this only if you have sufficient flexibility in the legs, hips, and back

(Retrieved from <http://www.yogajournal.com/poses/476>)

## **Bound Angle Pose** Baddha Konasana (*BAH-dah cone-AHS-anna*)

*baddha* = bound

*kona* = angle



### **Step by Step**

Sit with your legs straight out in front of you, raising your pelvis on a blanket if your hips or groins are tight. Exhale, bend your knees, pull your heels toward your pelvis, then drop your knees out to the sides and press the soles of your feet together.

Bring your heels as close to your pelvis as you comfortably can. With the first and second finger and thumb, grasp the big toe of each foot. Always keep the outer edges of the feet firmly on the floor. If it isn't possible to hold the toes, clasp each hand around the same-side ankle or shin.

Sit so that the pubis in front and the tailbone in back are equidistant from the floor. The perineum then will be approximately parallel to the floor and the pelvis in a neutral position.

Firm the sacrum and shoulder blades against the back and lengthen the front torso through the top of the sternum.

Never force your knees down. Instead release the heads of the thigh bones toward the floor. When this action leads, the knees follow. Stay in this pose anywhere from 1 to 5 minutes. Then inhale, lift your knees away from the floor, and extend the legs back to their original position.

### **Anatomical Focus**

- Thighs

### **Therapeutic Applications**

- Sciatica

### **Benefits**

- Stimulates abdominal organs, ovaries and prostate gland, bladder, and kidneys
- Stimulates the heart and improves general circulation
- Stretches the inner thighs, groins, and knees
- Helps relieve mild depression, anxiety, and fatigue
- Soothes menstrual discomfort and sciatica
- Helps relieve the symptoms of menopause
- Therapeutic for flat feet, high blood pressure, infertility, and asthma
- Consistent practice of this pose until late into pregnancy is said to help ease childbirth.
- Traditional texts say that Baddha Konasana destroys disease and gets rid of fatigue.

### **Contraindications and Cautions**

- Groin or knee injury: Only perform this pose with blanket support under the outer thighs.

## **Beginner's Tip**

It can be difficult to lower the knees toward the floor. If your knees are very high and your back rounded, be sure to sit on a high support, even as high as a foot off the floor.

## **Variations**

Exhale and lean your torso forward between the knees. Remember to come forward from the hip joints, not the waist. Bend your elbows and push them against the inner thighs or calves (but never on the knees). If your head doesn't rest comfortably on the floor, support it on a block or the front edge of a chair seat.

## **Modifications and Props**

To understand the release of the heads of the thigh bones, fold two blankets and put one under each outer thigh, supporting the thighs an inch or so above their maximum stretch. Then lay a 10-pound sand bag on each inner groin, parallel to the crease between the thigh and pelvis. Release the thigh heads away from the weight, and let them sink into the blankets. Do not use the bags unless the thighs are supported.

## **Partnering**

A partner can help you learn how to work the inner thighs in this pose. Perform Baddha Konasana. Loop a strap over each groin, with the free ends of the straps leading away from your back torso. Have your partner sit behind you and pull on the straps (perpendicular to the line of the thighs). Your partner can also press one foot lightly against the back of your pelvis at the same time. Lean slightly forward, releasing the heads of the thigh bones away from the straps.

## **Deepen The Pose**

Imagine you have two partners, each pressing inward (toward the pelvis) on a knee. From the middle of your sacrum, push out along the outer thighs against this imaginary resistance. Then push the heels firmly together from the knees.

**Appendix K: Summary of Studies**

	<b>Population/ location/time</b>	<b>Type of practice</b>	<b>Focus</b>	<b>Teacher Training</b>
<p><b><u>Yoga Therapy</u> in practice: principles, practice, and research. (2009)</b></p> <p><b>Trauma Center of Justice Resource Institute,</b></p> <p>Brookline, MA</p>	<p>16 women ages 25-55 randomly selected for</p> <p>either <b>8 sessions</b> <b>1x week</b> gentle <b>75-minute</b></p> <p>Hatha Yoga class or Dialectical Behavior Therapy (DBT) group.</p>	<p>Use of chair in seated postures</p> <p>&amp; gradually advance to working on the floor if/when the student is ready.</p>	<p>Mindful dual awareness &amp; use of empowering language “choices”</p> <p>“when you are ready”.</p>	<p>Yes</p> <p>Designed for office-based behavioral health settings. No former Yoga training required.</p>
<p><b><u>iRest:</u> Feasibility study at Walter Reed. (2006)</b></p> <p>Washington, DC</p>	<p>7 adult men and women military</p> <p><b>9-week / 18, 35 minute class</b> + daily home practice use of pre-recorded disks provided by the instructor</p>	<p>(Yoga Nidra: wakeful sleep)</p> <p>Practiced in supine position; (laying on the floor).</p> <p>Primarily breathing Exercises.</p>	<p>Use of breathe &amp; deep relaxation</p>	<p>Yes</p> <p>Designed for military population. Must be Registered Yoga Teacher or physical/ occupational therapist. Currently being adapted for the general population.</p>

<b><u>Yoga Warriors:</u></b> <b>(2009)</b> Boylston, MA	70 deployed U.S. military men & women in Iraq  <b>35 randomly assigned nine 90-minute YW sessions at least 2x per week</b>	Postures selected to enhance proprioceptive (muscle) input, deep touch pressure, some slow rhythmical movement, breathing techniques & use of affirmations.	Integration of carefully selected practices designed to calm the nervous system.	Yes  Designed military population.
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### **Appendix L: Saint Francis of Assisi and Margaret Mead**

Margaret Mead, (December 16, 1901 – November 15, 1978) a woman anthropologist who was a strong proponent of women's rights, who shone a light of understanding on human nature, and

a clear and forceful entity who provided much knowledge to the field of anthropology and psychology. (Retrieved from [http://anthropology.usf.edu/women/mead/margaret\\_mead.htm](http://anthropology.usf.edu/women/mead/margaret_mead.htm))

Saint Francis of Assisi, (1182 – October 4, 1226) founded the Franciscan Order or "Friars Minor". He is the patron saint of animals, merchants, Italy, Catholic action, and the environment. (Retrieved from <http://www.unitedearth.com.au/assisi.html#quotes>)

*Never doubt that a small group of thoughtful,  
committed people can change the world.  
Indeed, it is the only thing that ever has.*

Margaret Mead

(see Appendix L)