

Yoga Therapy in Practice

Mass Disasters and Mind-Body Solutions: Evidence and Field Insights

Patricia L. Gerbarg, MD,¹ Gretchen Wallace,² Richard P. Brown, MD³

1. *New York Medical College, Valhalla, NY*; 2. *Global Grassroots, Hanover, NH*; 3. *Columbia University College of Physicians and Surgeons, New York, NY*

Abstract: Treatment for the psychological consequences of mass disasters is essential to the recovery of individuals and communities. Little is known about how to provide effective mental health interventions when there are thousands of victims and little, if any, access to care. Post-disaster research and program evaluations suggest that mind-body practices can provide significant relief of anxiety, depression, posttraumatic stress, and physical ailments. Mind-body programs are inexpensive, adaptable to different cultures and conditions, and can be taught rapidly to large numbers of people, including community leaders, to create a sustainable resource for local mental health needs. The challenges of doing research in disaster areas are illustrated using examples from field studies. Potential risks of administering programs to vulnerable populations are discussed, with program design recommendations. The development of safe, effective, trauma-sensitive, culturally appropriate, sustainable programs requires research and collaboration among healthcare professionals, mind-body trainers, researchers, academic institutions, government agencies, and non-governmental humanitarian organizations.

Key words: mass disasters, trauma, PTSD, yoga, mind-body, stress, genocide, depression, anxiety, breathing, meditation, post-conflict

Correspondence: Patricia L. Gerbarg, 86 Sherry Lane, Kingston, NY 12401. *PGerbarg@aol.com*.

Introduction

Our world is experiencing a cascade of natural and man-made disasters—floods, earthquakes, wars, terrorism, oil spills—that leave physical, mental, emotional, and economic wounds. Most relief efforts focus resources on ensuring physical survival by providing rescue, food, water, shelter, and medical care. Yet the emotional needs

of disaster survivors exist as well, surfacing days or even years later. Treatment for the psychological distress from mass disasters is crucial for preventing long-term negative outcomes such as chronic posttraumatic stress disorder (PTSD). The standard one-on-one, therapist-patient (plus medication) model of mental healthcare cannot address traumas that strike tens of thousands of people in one day.

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Service providers are beginning to incorporate mind-body practices, such as breathing and relaxation, into disaster-recovery programs. Program evaluations indicate a positive impact, but more clinical research is needed. Unfortunately, existing research on the use of mind-body practices in disaster areas is limited, and challenges exist in obtaining valid data. Research is needed to develop the full potential of mind-body practices and their adaptation to diverse cultures facing the burdens of recovery from mass disasters.

This article will explore how mind-body programs can provide practical, effective relief for psychological distress associated with mass disasters. After reviewing existing research and program evaluations supporting the effectiveness of these approaches, we will address challenges involved in post-disaster research. Minimizing risks and adverse reactions, trauma sensitivity, cultural sensitivity, program sustainability, community resilience, and caregiver stress will be discussed. The need for collaboration among researchers, mental health clinicians, mind-body trainers, non-governmental organizations (NGOs), and funding agencies in program design, implementation, and evaluation is highlighted.

Authors' Background

The development of new, cost-effective programs to alleviate and prevent adverse effects of mass disasters on mental health requires researchers, clinicians, and yoga teachers to work together. This article emerged from collaboration among the authors to provide emergency relief for survivors of the 2010 earthquake in Haiti. Dr. Richard Brown and Dr. Patricia Gerbarg are clinician-researchers who develop treatments combining standard and complementary approaches to optimize patient outcomes. To this task they bring over 30 years of clinical experience, trauma training, and scientific research. Dr. Brown created Breath Body Mind (BBM) programs for relief of anxiety disorders, depression, and posttraumatic stress disorder (PTSD). BBM is rooted in martial arts such as aikido, contemplative practices such as Zen meditation, and healing traditions such as yoga and qigong. Dr. Gerbarg applies neuro-psychoanalytic training to bridge the gaps between psychiatry and mind-body practices. Her clinical observations come from assisting Dr. Brown in teaching mind-body courses to thousands of participants, incorporating breathwork into her psychotherapy practice, and providing consultation to teachers and students of yoga.

Gretchen Steidle Wallace is an Integrative Breathwork practitioner and founder and president of Global Grassroots,

a social venture incubator based in Rwanda that teaches mind-body practices, conscious leadership, and social entrepreneurship to vulnerable women. After training with Brown and Gerbarg, she utilized BBM to help women and children in Haiti and Rwanda.

Interviews with Shirley Telles, James Gordon, and Teresa Descilo, researchers of mind-body practices in mass disasters, provided additional perspectives for the article.

Potential of Mind-Body Programs in Post-Disaster Environments

It is only in the last 25 years that the mental health needs of disaster survivors have been officially recognized by governments and humanitarian agencies. When identified, such needs are usually addressed long after the disaster. In developing nations, mental health services and medications are usually inaccessible during and after mass disasters. In 2004 there were fewer than 100 doctors in Southern Sudan (about one doctor per 70,000 people).¹ High levels of poor mental health affect the ability of communities to function, recover, and move towards reconciliation.² Even in the United States, mass disasters such as the September 11th, 2001 attacks and Hurricane Katrina overwhelm healthcare systems.³⁻⁶

Mind-body practices offer an effective alternative response to mental health needs in the aftermath of a disaster. For the purposes of this article, the term “mind-body practices” will encompass movement, breathing, and meditation techniques that engage the body, mind, and emotions for healing and recovery from trauma. These techniques derive from many philosophical, spiritual, and scientific traditions, such as yoga, tai chi, qigong, Buddhism, Christian prayer and meditation, and modern neuroscience.

Mind-body programs for relief of immediate and long-term effects of mass disasters offer several advantages. First, they are adaptable to local needs, cultures, religions, and languages. Second, they are low-cost, requiring no equipment, electricity, or specific spaces, and they involve fewer healthcare professionals. Third, through group programs, a few teachers can rapidly serve large numbers of survivors. Fourth, community leaders can be rapidly trained to teach simple techniques, extending the benefits to others and creating a sustainable resource for long-term treatment and support. This is an important consideration, given that the psychological effects of mass disasters can last for years and be transmitted to subsequent generations.⁷⁻⁹

Research Overview on the Effects of Mind-Body Programs in Disaster Survivors

Research on methods to prevent or treat PTSD under conditions of mass trauma is in its infancy. Many studies have documented benefits of mind-body practices for anxiety, depression, and PTSD.¹⁰⁻²² Despite the increased use of mind-body practices in disaster areas, very few studies have been done in disaster zones. Most of the published studies in disaster areas have been conducted long after the calamity and have primarily documented the incidence of psychological disorders, rather than the effects of treatment trials.^{1,23,24} Other studies focus on survivors who immigrated to new host countries with resources for research, unlike their homelands.²⁵⁻²⁷ These studies provide valuable insights regarding refugee populations, but they fall short of addressing the many challenges of providing psychological relief to those who remain at the site of a disaster. As a result, little is known about how to provide effective mental health interventions, including mind-body therapies, during and immediately after disasters. Therefore, in order to expand the search for evidence on the efficacy of post-disaster interventions, this review of research studies is followed by a discussion of program evaluation data on mind-body practices in disaster areas.

Dr. James Gordon, Director of The Center for Mind Body Medicine in Washington, DC, developed multicomponent programs to treat PTSD in postwar Kosovo, Gaza, and Israel, as well as for American veterans. His 12-week programs include slow breathing, meditation, biofeedback, movement, guided imagery, autogenic training, genograms and drawings, shaking and dancing, and simple written exercises. Gordon and colleagues²⁸ conducted a randomized, wait-list-controlled study of 82 adolescents with PTSD in postwar Kosovo. Classroom school teachers were trained to provide a 12-session mind-body skills program and were supervised by psychiatrists and psychologists. Students had significantly lower PTSD scores (Harvard Trauma Questionnaire) following the intervention compared with those in the wait-list control group ($F = 29.8$, $df = 1,76$; $p < .001$). The decreased PTSD symptom scores were maintained at a 3-month follow-up.

Shirley Telles, director of research at Patanjali Yogpeeth, Haridwar, India, studied the effects of a 1-week yoga program on self-rated fear, anxiety, sadness, and disturbed sleep in 47 survivors of the 2004 tsunami in the Andaman Islands, Bay of Bengal.²⁹ The yoga program, called Vivekananda

Yoga, is based on the Ashtanga Yoga principles of Patanjali. It includes loosening exercises (*sithilikarana vyayama*), specific postures (*asanas*), cleansing practices (*kriyas*), voluntarily regulated breathing (*pranayama*), yoga-based guided relaxation, and meditation (*dhyana*). Among those who participated in the study, 31 were settlers from mainland India, and 16 were indigenous people descended from hunter-gatherers. Self-rated fear, anxiety, sadness, and disturbed sleep were significantly lower in both groups following yoga compared to before ($p < .05$, for all comparisons). The conclusions from this study are limited due to lack of randomization or a control group.

In a randomized study of 22 survivors 1 month after a flood in Bihar, India, Telles evaluated the effects of a yoga practice taught by Swami Ramdev.³⁰ This yoga program was similar to the previous study, but had greater emphasis on breath practices. Subjects given this yoga practice 1 hour a day for 1 week showed a significant decrease in sadness ($p < .05$), whereas subjects in the control group had an increase in anxiety ($p < .05$). People were excluded from the study if they had any illness or were taking medication. None of the participants reported adverse effects of the program. The yoga program appeared to reduce feelings of sadness while preventing an increase in anxiety, suggesting a potential role for mind-body practices in preventing development of PTSD following disasters.

A nonrandomized, controlled study of 183 survivors of the 2004 Asian tsunami compared an 8-hour yoga-breath program alone and followed by a trauma-reduction exposure technique with a wait-list control group.³¹ Refugees who scored 50 or above on the Posttraumatic Checklist-17 (PCL-17) were assigned by camps to one of three groups: yoga-breath intervention; yoga-breath intervention followed by 3 to 8 hours of trauma-reduction exposure technique; or a 6-week wait-list. Measures of PTSD (PCL-17) and depression (BDI-21) were performed at baseline and 6, 12, and 24 weeks. Data were analyzed using ANOVA and mixed-effects regression. The effect of treatment versus control was highly significant at 6 weeks ($F_{2,178} = 279.616$, $p < 0.001$). Mean PCL-17 declined 42.52 ± 9.98 SD with yoga breath; 39.22 ± 17.22 with yoga breath + trauma-reduction exposure; and 4.61 ± 11.33 in the control. After 6 weeks, decreases of at least 60% in mean scores on the PCL-17 and 90% on the BDI occurred in the groups given BWS alone and BWS + TIR, compared to no change in the control group. In the BWS group, most of the improvement occurred within the first week. The benefits were maintained at a 24-week follow-up. Difficulties encountered during this study are reviewed below in the section on obstacles to research.

Authors Brown and Gerbarg conducted pilot studies with Martin Katzman and Monica Vermani of the Stress, Trauma, Anxiety, Rehabilitation (START) clinic in Toronto on the effects of Breath Body Mind (BBM), a 2-day program of breath practices (coherent breathing, resistance breathing, breath moving, and “Ha” breath), Qigong movements, and open focus meditation.³² They emphasized breathing techniques because both clinical experience and research findings suggest that these are the most rapidly effective and user-friendly methods for relief of anxiety, depression, and PTSD. For example, slow breathing at 5 to 6 breaths per minute (coherent or resonant breathing) has been shown to optimally balance the sympathovagal stress response systems for most adults.^{11,33-36} Resistance breathing (*ujjayi*, or “ocean breath”) combined with Breath Moving (a meditative practice developed by Russian Orthodox Christian monks in the eleventh century) further activates the parasympathetic system.^{11,36} The first study, conducted at the START clinic in Toronto, examined the effects of BBM on 24 adults with severe treatment-resistant generalized anxiety disorder (GAD), with comorbidities including panic disorder, obsessive-compulsive disorder, PTSD, social phobia, and depression. BBM significantly reduced scores ($p < .0001$) on the Anxiety Sensitivity Index, the Beck Anxiety Inventory, the Beck Depression Inventory, the Pittsburgh Sleep Quality Index, the Sheehan Disability Scale, and the Penn State Worry Questionnaire.³⁷

Working with the nonprofit organization Serving Those Who Serve (*stus.org*), Brown, Gerbarg, Katzman, and Vermani completed two preliminary studies showing that the 2-day Breath Body Mind program significantly relieved symptoms of PTSD, anxiety, and depression in First Responders and other people affected by the September 11 attacks.^{38,39} In the first study, 17 adult participants showed significant improvements in the Anxiety Sensitivity Index and the Beck Anxiety Inventory ($p < .001$), the Pittsburgh Sleep Quality Index ($p < .006$), and the Social Life subscale of the Sheehan Disability Scale ($p < .001$). The second study ($N = 27$) included 18 first responders and 6 Ground Zero workers. Of the 27 participants, 23 met criteria for PTSD, 12 for depression, 14 for GAD, 16 for panic disorder, and 9 for agoraphobia. A comparison of pre- and post-intervention measures showed significant improvements ($p < .001$) in anxiety and depression. This 2-day BBM program has been further simplified for use in disaster areas, where a trainer may have only a few hours to teach the practices. The results of these abbreviated programs are described below. Information on training in BBM programs is available at *haveahealthymind.com*.

Program Evaluations of Mind-Body Practices in Humanitarian Psycho-social Services for Disaster Survivors

Gretchen Wallace and Global Grassroots in Rwanda (globalgrassroots.org)

Since 2006, Global Grassroots has operated the Academy for Conscious Change in Rwanda. This program integrates mind-body practices with social entrepreneurship skills to support individual and community healing post-conflict. In the first 2 weeks of training, participants learn daily mind-body practices, including gentle hatha yoga, guided meditation, mindfulness, somatic exercises, breathwork, and other holistic exercises.

In an impact assessment of 36 trainees in 2009, among those who responded to the mind-body portion of the questionnaire, all 21 found value in the personal consciousness practices. 100% believed in their utility, used the practices regularly, and had adapted the practices to their own needs. Frequently used techniques included breathwork, mindfulness, cultivating compassion, meditation, deep listening, and self-care. In addition, they reported using the techniques at work, in their personal lives, and especially when interacting with beneficiaries of their social change projects.

Ellen Ratner and Christian Solidarity International in Sudan (csi-int.org)

Ellen Ratner, EdM, had been working with Christian Solidarity International to help Sudanese genocide survivors as well as women and children recently liberated from years of slavery. She wanted to offer them breath practices because there was virtually no mental health treatment available. These survivors have complex trauma and often function by suppression—prohibiting themselves from thinking about or experiencing feelings about the trauma.¹ Although suppression causes emotional numbing, it also enables trauma survivors to get through each day without becoming overwhelmed or losing control. Therefore, practices that might trigger traumatic memories or dissociation were contraindicated. Brown and Gerbarg suggested that Ratner introduce a few simple qigong movements and gentle coherent breathing, followed by rest. Ratner initially reported that the women had very positive responses to the program, with improvements in worry, fear, jumpiness, mood, and physical symptoms. Ratner offered these practices under the supervision of Dr. Luka Deng Kur at the Pamela Lipkin, MD, clinic in South Sudan, about 30 miles east of the border with Darfur.

To evaluate the effects of the techniques, different assessment methods were tried. Because participants were unable to understand or answer questions in the usual test format, the PTSD Checklist-17 (PCL-17) was converted to a PTSD visual analogue scale (VAS) using a 100 millimeter line for each of the 17 items. A six-item VAS Mood Scale developed by Telles³⁰ assessed anxious/worried, sad/depressed, helpless, angry, physical pain, and difficulty sleeping. Scores on each item ranged from 0 (not at all) to 100 (the worst ever), based upon where the participant placed a mark on each 100 mm line. Thus the maximum possible severity score on VAS PTSD was 1,700 and on the VAS Mood Scale 600. Both scales were administered at baseline (T1) to 19 adult Sudanese women who were survivors of war and genocide traumas. Five days a week the participants were given an abbreviated BBM program of three qigong movements and 20 minutes of coherent breathing by the clinic staff. Both VAS scales were then administered after 6 (T2) and 18 (T3) weeks. See Table 1 for mean scores at baseline and subsequent timepoints. The improvement in mean scores at 6 weeks was 100 on the VAS Mood Scale and 321 on the VAS PTSD Scale; at 18 weeks, the change in mean scores was 137 on VAS Mood and 348 on VAS PTSD. After 18 weeks of practice, this represents an improvement of 66% on VAS Mood Scale and 71% on VAS PTSD Scale.

Patricia Cane and Capacitar International
(capacitar.org)

Capacitar International is an American NGO founded in 1988 by Patricia Cane, PhD, in response to war trauma in Nicaragua. It now operates through local networks in over 35 countries, teaching mind-body interventions through a popular educational approach for trauma-healing from war. Techniques used by Capacitar include tai chi meditation, pal dan gum and qigong body movement, visualization,

breathwork, active listening, simple psychotherapeutic skills, acupressure, finger holds, energy-tapping, hand massage, seated massage, and polarity work with the energy system and *chakras*.

In June of 2002, Capacitar surveyed life changes among their participants from the United States and Latin America. They found that 55% of respondents were using breathwork daily and 54.8% were using meditation or centering daily. Overall, tai chi, breathwork, meditation, acupressure, and finger holds were the top five practices, used by 87% or more of the respondents. Furthermore, 93.5% responded that their emotional outlook had improved or greatly improved, and 89% indicated their mental outlook and physical energy had improved or greatly improved. 67% reported that Capacitar had changed their life, and 97% had used Capacitar practices with other people. As with many grassroots approaches to mind-body trauma healing, Capacitar teaches such practices with the expectation that trainees will go on to train others. A 2008–2009 evaluation in Rwanda documented that 27 trainees representing 17 organizations in four provinces had trained over 8000 other people.

Evaluations of these three programs suggest a positive impact of mind-body practices among populations affected by war and disaster. However, independent clinical studies are needed to validate these findings.

Challenges of Conducting Research in Disaster Areas and Research Design Considerations

As we consider how to advance disaster-recovery research, it is important to understand that significant obstacles limit participation in field studies. Difficulties include destruction of transportation routes, unsafe conditions, and limited access to food, water, and shelter for staff. Illiteracy,

	Mean Test Scores			Changes in Mean Scores/ % Changes in Mean Scores	
	Baseline	6 weeks	18 weeks	0 to 6 weeks	0 to 18 weeks
VAS PTSD	493	172	145	321 65%	348 71%
VAS Mood	208	108	71	100 48%	137 66%

Table 1. *BBM program evaluation in Sudan: Mean scores and changes in mean scores.*

language barriers, and cultural issues must be addressed to provide appropriate interventions and test measures. Support and advice from local residents who know the language and culture is invaluable. Organizing research teams, finding funding, and obtaining official approvals can take 6 months to a year or more. Below, we describe some of the problems we faced during studies in the aftermath of the 2004 Southeast Asia tsunami, the 2010 earthquake in Haiti, and postwar Sudan and Rwanda. We hope that sharing our knowledge gained from the challenges encountered in disaster research will contribute to the success of future efforts, and serve as examples of some practical issues to be considered in research and program design.

2004 Southeast Asia Tsunami Study

When we (Brown and Gerbarg) heard that the International Association for Human Values, a United Nations NGO, was delivering yoga programs to thousands of survivors of the 2004 Southeast Asia tsunami, we offered to study the effects. Collaborating with the Trauma Resolution Center of Miami, the National Institute of Mental Health and Neurosciences of India, and Ved Vignan Maha Vidya Peeth (VVMVP) of Bangalore, India, we planned a randomized controlled study of an 8-hour breath-based yoga program called Breath Water Sound, enhanced with *sudarshan kriya* and an exposure therapy called Trauma Incident Reduction (TIR).³¹ Developed by Sri Sri Ravi Shankar, Breath Water Sound includes *ujjayi* and *bhastrika* (bellows) breathing techniques; the 10-minute *sudarshan kriya* consists of cyclical breathing at slow, medium, and fast rates. VVMVP provided yoga teachers and Tamil-speaking volunteers. Teresa Descilo trained and supervised the testers and TIR facilitators. B. Damodaran, who was familiar with local customs, organized and supervised the study on site. The study included 183 tsunami survivors from the most severely devastated coastal villages who were living in five refugee camps 8 months after the tsunami. The following description illustrates how the research team dealt with logistical and cultural challenges during this study.

The first obstacle was the refugee camp administrator, who refused to allow participants to be randomly assigned to groups. The administrator, who was scrupulous in distributing scarce supplies equally among all camp inhabitants, feared that if some refugees were given an intervention while others were not, it would be perceived as unfair and would disrupt the social order of the camp. The protocol had to be compromised by assigning entire camps to each group rather than using strict randomization.

The second obstacle was that most refugees had never attended school or taken tests. B. Damodaran warned that if tests were administered in groups, people would shout out answers and invalidate the tests. The team had to mobilize an army of testers to administer each test individually. With 183 participants given four or five sets of three tests each, a total of 2,500 tests were individually administered by testers sitting in heat exceeding 100 degrees. This took over 800 person-hours.

The third problem involved issues of gender and confidentiality. Because the young women expressed discomfort speaking with male facilitators, subjects had to be reassigned so that only men and older women worked with male facilitators. Also, the last question on the Beck Depression Inventory, which asks about sexual desire, was embarrassing and offensive to women unaccustomed to discussing such matters. Therefore, this question was omitted from the study. Further, the village women were generally shy and secretive about their personal lives. Yet, through the programs offered, many were able share their experiences. This led to a more serious problem when some women talked about being abused. Within their culture, spousal abuse is accepted and telling about abuse is forbidden. One woman described being repeatedly raped by her brother-in-law. If it had become known that she had told about the abuse, then both she and the facilitator she confessed to would have been murdered. Confidentiality was crucial for the safety of the subjects and the research staff.

Cultural manifestations of stress were also challenging. For example, during this study, B. Damodaran heard a loud hissing sound coming from a session room, followed by the shouts of a facilitator. Through the window he saw a woman, eyes rolled back up in their sockets, moving like a snake with her tongue protruding as she moaned, “I am a snake goddess.” Having grown up in a culture that worshipped the snake, Damodaran had witnessed snake possession within normal group religious rituals, but not in an individual as manifestation of illness. He entered the room, quietly sat down across from the woman, and breathed slowly as she told her story: “My mother-in-law caused my problems by doing black magic to me. I came from a poor family, married without a dowry, and went to live in the house of my husband’s family. My mother-in-law criticized me and my family, threatening to get another wife for my husband. When a neighbor told me that my mother-in-law visited a black magic temple, I realized she had used black magic to change me... I started to act and dance like a snake whenever I felt sad or stressed.” The woman’s breathing became rapid and heavy. Damodaran shifted to slow deep breathing

and her breath followed his, calming her down. After working with Damodaran for about an hour, the woman recovered. Later she described her experience, “The Breath Water Sound brought many changes to my body and mind. After doing *bhastrika pranayama*, my body opened up; before that my body always shrank like a snake. The black magic will not work on me now and I feel lighter.” She was followed for 8 months, during which she felt well and there was no recurrence of symptoms. Damodaran believes that the power of faith, the effects of breath practices, and TIR counseling with a caring, supportive, nonjudgmental therapist each played a role in relieving the suffering that had been expressed in the form of snake possession.

Conditions in the camp were physically difficult due to intense heat and limited supplies of food and water. Facilitators and translators were also deeply affected emotionally when survivors told about their losses, such as seeing faces of their loved ones in the flood waters. Research staff and volunteers were given movement, breathing, and meditation practices as well as TIR sessions to relieve secondary trauma.

2010 Haiti Earthquake

Following the 2010 earthquake in Haiti, I (Gretchen Wallace) initially provided a mind-body intervention one evening to a group of 50 women living in a makeshift tent camp. When I returned 2 weeks later, some had relocated to other camps. Fortunately, I had worked through a local NGO, Ananda Marga Universal Relief Team Ladies (AMURTEL), who maintained contact with the women and provided a space for them to meet. Consequently, I was able to continue working with most of the women.

After the earthquake, transportation was limited and electricity disrupted. The Breath Body Mind program was adaptable because it did not require electricity or transportation of equipment. For example, when coherent breathing is taught in the United States, a recorded chime sound track is used to pace the breathing at 5 breaths per minute (Steven Elliot, Respire-1, coherence.com). In Haiti, when there was no electricity available, I improvised with a small church bell to keep pace with the chime track played on my iPod. Without a bell, a drum or any object could be used to create a gentle rhythmic sound.

Another challenge in Haiti was finding a safe location amid the surrounding destruction and debris. Fear of aftershocks prevented Haitians from entering any buildings left standing. I worked outdoors using tarps spread on the ground. This exposed the program to the entire camp of 200 men, women, and children, who gathered to watch. At Dr.

Brown and Dr. Gerbarg’s suggestion, I paced the breathing for younger children at 10 breaths per minute, double the rate for adults. Thus, everyone could pace their breathing with the same bell tones. The children enjoyed copying the Qigong movements, and many became relaxed or drifted off to sleep during the breath practice.

Postwar and Post-Genocide Rwanda

As mentioned previously, follow up assessments in post-genocide Rwanda indicate that participants in the Academy for Conscious Change continue to use mind-body techniques years after their initial training. These practices have helped them to maintain their recovery and manage ongoing stress from their life of poverty and exposure to violence. However, measuring the effects of these practices on PTSD and other disorders presented challenges.

In developing test instruments, I (Wallace) learned that in Kinyarwanda, the native language of Rwanda, many words are combined to create a single meaning. For example, prior to the genocide, there were no words for trauma or PTSD. A new word, *gabukamuka*, was created to encompass experiences related to the genocide, including despair, excessive crying, being easily startled, having flashbacks and repeatedly dreaming of bad events.⁴⁰ While numerical rating scales could be used, because Kinyarwanda can express gradations of meaning, numerical rating scales were too abstract for some participants with minimal education. Also, responding to written test items was uncomfortable compared with the cultural norm of storytelling. In these cases, individual interviews by test administrators were more appropriate. Additional impediments were the prevalence of gossip, fear of repercussions related to genocide testimony, and stigma associated with mental health issues. Therefore, protecting the privacy and confidentiality of participants was crucial.

Program Design Considerations

Risks and Adverse Reactions to Mind-Body Practices

Many of the beautiful yoga practices taught in a studio with generally healthy people may not be helpful, safe, or practical for trauma survivors in disaster areas. In a regular ongoing class, the teacher can closely observe participants, adjusting the techniques to individual needs and taking time to teach in-depth complex practices. In contrast, when giving an open class to large groups who may speak a different language, it is better to teach a small number of simple calming practices, especially if time is limited. For example, rapid or forceful breath practices may be unsafe during preg-

nancy and for people with cardiovascular disease, high blood pressure, lung disease, acute asthma, or seizure disorders.¹³ Furthermore, in disaster survivors with PTSD, the stress-response system is altered, reactions to stimuli are different, and physical health may be compromised.⁴¹⁻⁴³ Therefore, the practices must be gentle and non-excitatory.

We (Brown and Gerbarg) have observed cases in which rapid breathing practices triggered panic attacks in those with anxiety disorders, manic episodes in those with bipolar disorder, flashbacks in those with PTSD, and altered states of consciousness or psychotic episodes in individuals with a tenuous sense of reality, such as those with schizophrenia or bipolar disorder.¹³ These observations are consistent with studies showing that people with acute stress disorder given a hyperventilation (rapid breathing) provocation test (HVPT) for 3 to 5 minutes are more likely to experience a flashback or intrusive memory, and this effect is related to hyperarousal.⁴⁴⁻⁴⁶ Hyperventilation is breathing faster or deeper than necessary and it reduces the serum concentration of carbon dioxide (CO₂) below normal (40 Torr). When starting to learn breathing practices, many beginners exhale too forcefully, especially during rapid breathing, expelling too much carbon dioxide. This can lead to hypocapnia, a decline in the partial pressure of carbon dioxide (PCO₂), which can cause tingling or spasms of the hands and feet, hyperarousal, and altered mental states. Individuals with panic disorder may feel like they are about to have a panic attack when they begin rapid breathing because it reminds them of the hyperventilation that can occur during a panic attack.⁴⁷ Simply worrying about or anticipating this can precipitate a panic attack. Patients with anxiety disorders, acute stress disorder, panic disorder, PTSD, or bipolar disorder tend to have higher sympathetic system activity, lower parasympathetic system activity, lower baseline PCO₂, and greater reactivity to changes in PCO₂. These individuals, who have chronically high arousal levels, are vulnerable to drops in PCO₂ that would be benign in healthy individuals.⁴⁸ Studies of high-frequency yoga breathing such as *kapalabhati* and *bhastrika* have also shown increases in the faster alpha and beta-1 brain wave activity on EEG within the first 5 minutes and autonomic system changes suggesting increased sympathetic and decreased parasympathetic activity.⁴⁹⁻⁵³ This likely contributes to the increased risk for panic attacks, flashbacks, or manic states during and after rapid breath practices.

It is possible that rapid breathing practices such as *kapalabhati*, *bhastrika* (bellows breath), and rapid cycle breathing may have an important place in treatment of PTSD, when administered under supervision of an experienced yoga teacher in collaboration with a mental health professional. For example, in working with disaster survivors, Telles^{29,30} and Descilo³¹

have used rapid breathing very briefly followed immediately by slow breathing. In our first study of people affected by the World Trade Center attacks, we (Brown and Gerbarg) used a few minutes of *bhastrika* (80 breaths per minute).³⁸ However, employing rapid breath practices in mass disasters when there may not be adequate support or follow-up requires caution. We eliminated *bhastrika* in our second study, and found that Breath Body Mind was effective without rapid breathing.³⁹ Consequently, we eliminated rapid breathing from all basic BBM and trauma relief programs.

Another concern when working with trauma survivors is the triggering of traumatic flashbacks. Survivors of genocide in countries like Sudan and Rwanda have been victims or witnesses of murder, rape, torture, starvation, and severe deprivation. In the 1994 Rwandan genocide, nearly one million people were killed in 100 days. In 2010, during the International Symposium on the Genocide Perpetrated Against Tutsi, the Ministry of Health reported that 80% of Rwandese experienced trauma during the genocide, and today 28.5% of Rwandese still have symptoms of PTSD, over 50% of whom also present with comorbid depression.⁵⁴ Studies indicate that 79% of PTSD patients are more symptomatic during the annual genocide commemoration period due to exposure to traumatic images and survivor testimonies.⁵⁵

For people with prolonged exposure to extreme trauma, the term “complex PTSD” is used to indicate a more severe disorder that includes somatization (physical expression of PTSD), as well as alterations in the regulation of emotion and impulses, attention or consciousness, self-perception and perception of the perpetrator, relations with others, and systems of meanings.²⁵ Because such individuals may function by suppression of feelings and memories, they are at risk for adverse reactions to anything that lowers their defenses and exposes them to memory triggers.⁵⁶ Flashbacks can be triggered by anything that reminds the person of their trauma, including physical postures, their own thoughts and memories, or shifts in their state of consciousness. For example, unguided, silent meditation can open the mind to the intrusion of overwhelming trauma memories. Such practices would be contraindicated in group contexts where intensive support for handling such experiences is not available. Also, in working with survivors of war, sexual violence, genocide, or torture, yoga postures must be trauma-sensitive. For example, in Rwanda, perpetrators forced genocide victims to lie down side-by-side prior to execution. For those who survived or witnessed such events, doing corpse pose or breathing exercises while lying down can trigger trauma memories. In these cases, standing or sitting positions are preferable. We have also observed during yoga workshops in the United

States and other countries that intense rapid breathing practices can induce manic episodes or altered states of consciousness during which flashbacks and dissociation are more likely to occur, re-traumatizing the victim. In addition to our own observations, yoga teachers and mental health care workers have reported incidents to us while seeking our advice on what to do. In some cases, stabilization required psychiatric intervention, medication, or hospitalization.

The risk of adverse reactions can be reduced by creating a secure environment for practice, ensuring safety during and after sessions, training instructors to assist survivors who are re-experiencing traumatic memories, minimizing silent unguided meditation, and avoiding practices (such as rapid breathing) that can alter states of consciousness or exacerbate anxiety.

Cultural Sensitivity

Cultural sensitivity includes awareness of activities or practices that may be inappropriate in different communities. Eliminating religious or spiritual content, words, images, objects, and references is one way to avoid offending people of different religions. However, in many cultures, additional adaptations are necessary.

In Haiti, the predominant religion is Catholicism with a strong underground current of Voodoo. When I (Wallace) went to Haiti to introduce Body Breath Mind practices, I encountered widespread skepticism of Eastern mindfulness techniques. Aversion to meditation or yoga stems from a misconception that they involve or invoke the devil. It was necessary to adapt mind-body techniques by avoiding discussions of Eastern philosophy, *chakras*, meridians, or energy flow. Instead, I discussed the women's trauma symptoms and emphasized the physiological and emotional benefits of the breath and movement practices.

Dr. James Gordon (in an interview with the authors) points out that in some countries, yoga postures may be inappropriate or offensive, particularly if the legs are spread open. Further, some cultures do not embrace movement and dancing. It may be necessary to conduct yoga in private spaces that do not invite crowds of onlookers. In strict Islamic and orthodox Jewish societies, separate rooms may be required for men and women. Many yoga poses may simply be impossible for participants wearing traditional clothing. Gordon suggests that the best way to avoid cultural blunders is first to review the entire program and teaching materials with a local representative. Verifying the acceptability of techniques, testing translations, and identifying mind-body practices that are similar to local cultural practices helps minimize misunderstandings. Many problems are prevented by showing respect for local cultures and collaborating with local leaders.

Sustainability

Sustainability is essential for long-term effectiveness. Training local residents to lead mind-body practices after the initial intervention is a key driver of sustainability. In an interview with the authors, Teresa Descilo, director of The Trauma Resolution Center of Miami (*thetrcenter.org*), notes that, "Mind-body practices can be taught to the natural healers of any country as well as lay people." Dr. Gordon's programs train people in each community to continue the work while CMBM staff provides ongoing support and supervision. He believes that to be effective, "the approach has to give people tools for helping themselves. It is crucial that people in the situation be trained to do the work. Coming from another country, you can't do it all yourself. We teach the local trainers self-awareness and self-care, and we help them set up support networks." For example, in Gaza, his team trained 240 local providers who subsequently delivered programs to over 30,000 people.

Inoculate Against Secondary Trauma and Practice Self-Care

Caregiver stress and secondary trauma refer to the adverse effects caregivers may experience while working in disaster zones where they are exposed to extreme suffering. This becomes even more critical when community providers experience the disaster themselves and may have lost loved ones or have families under severe stress. A caregiver who becomes overwhelmed, stressed, exhausted, anxious, frustrated, or afraid will be unable to provide a safe and calming space for healing others. It is crucial to know one's own limits, to prepare by practicing self-care techniques, and to participate in group support with coworkers. Training in mind-body practices can provide trauma inoculation, enabling people to reduce anxiety, difficulty sleeping, fatigue, and physical symptoms related to a mass disaster in situations where there may be no relief for days or weeks. Along these lines, NGOs and service providers are developing programs for community resiliency, self-care, and trauma stewardship.⁵⁷

Dr. Gordon notes that many CMBM teacher trainees feel devastated, trapped, enraged, mistrustful, neglected, resentful, unable to sleep, and engaged in family conflicts and work problems. The first part of their teacher training focuses on how to use the techniques to manage their own stress, anxiety, anger, moods, and sense of professional competence. Global Grassroots similarly incorporates extensive training in self-care for future change agents and their staff, including understanding coping mechanisms, recognizing indicators of stress, and using breathwork, mindfulness, meditation, and group dialogue to prevent burnout. At the

Trauma Resolution Center of Miami, workshops are offered for professionals and the general public. Descilo points out that a disaster-preparedness checklist should include not only things to ensure physical survival (clean water, food, first aid kit, flashlights, radio) but also skills in mind-body practices that support stress resilience in the event of a disaster. Descilo's staff works with thousands of trauma victims every year. In order to prevent compassion fatigue and maintain stress resilience, her staff engages in mind-body practices that include breathwork, meditation, yoga, qigong, and sound bowls. They also teach other community agencies these techniques. After the 2005 hurricane season, the Children's Trust funded their "Relax Miami" program, renamed "Building Community Resiliency," when the Red Cross funded it as a community-wide service in 2008.

Conclusions and Future Directions

Mind-body practices have been shown to reduce symptoms of anxiety, depression, and PTSD in survivors of mass disasters. They offer effective, low-cost, low-risk solutions for relief of emotional and psychological distress in survivors of mass disasters. When designed to accommodate local cultural traditions, the nature of the trauma, and long-term sustainability, mind-body programs can meet the urgent need for immediate psychological relief post-disaster as well as during the recovery years. When treatment for posttraumatic stress is available, survivors are better able to heal from emotional and physical injuries. They are also able to attend more resourcefully and resiliently to needs not addressed by relief aid, which may be limited or delayed, as well as to forge bonds within their community to solve problems collectively, rather than resorting to violence for self-preservation. Mind-body practices not only serve disaster survivors but also provide tools to ameliorate the stress of trauma exposure among service providers. As safe, simple, adaptable, and cost-effective interventions, mind-body techniques support individual and community-wide wellness, essential for healing and reconstruction post-disaster.

Given the potential benefits and the dire need for practical solutions, more research is warranted to validate the positive impact of mind-body interventions in post-disaster and post-conflict environments. Well-designed clinical research can provide data to identify benefits and improve mind-body treatment programs. Therefore, we highlight the need for collaboration among government agencies, NGOs, academic centers, mind-body trainers, and healthcare professionals to further our understanding as well as investment in mind-body treatments for disaster-related posttraumatic stress.

References

1. Roberts B, Damundu EY, Lomoro O, Sondorp E. Post-conflict mental health needs: a cross-sectional survey of trauma, depression and associated factors in Juba, Southern Sudan. *BioMed Central Psychiatry*. Mar 2009;9:7.
2. Pham PN, Weinstein HM, Longman T. Trauma and PTSD symptoms in Rwanda: implications for attitudes toward justice and reconciliation. *Journal of the American Medical Association*. 2004;292(5):602-12.
3. Garrett AL, Grant R, Madrid P, Brito A, Abramson D, Redlener I. Children and megadisasters: lessons learned in the new millennium. *Advances in Pediatrics*. 2007;54:189-214.
4. Gerbarg, PL, Brown RP. Yoga: a breath of relief for Hurricane Katrina refugees. *Current Psychiatry*. 2005;4:55-67.
5. Madrid PA, Sinclair H, Bankston AQ, Overholt S, Brito A, Domnitz R, Grant R. Building integrated mental health and medical programs for vulnerable populations post-disaster: connecting children and families to a medical home. *Prehospital and Disaster Medicine* 2008;23(4):314-21.
6. Redlener I, DeRosa, C, Parisi, K. Significant emotional distress, behavioral problems and instability persist among children affected by the 2005 disaster in legacy of Katrina: the impact of a flawed recovery on vulnerable children of the Gulf Coast. A five-year status report. Children's Health Fund and The National Center for Disaster Preparedness, Columbia University Mailman School of Public Health. 2010. www.childrenshealthfund.org/sites/default/files/files/Five-Years-After-Katrina-Web.pdf. Accessed February 12, 2011.
7. Brave Heart MY, DeBruyn LM. The American Indian Holocaust: healing historical unresolved grief. *American Indian and Alaska Native Mental Health Research*. 1998;8(2):56-78.
8. Iliceto P, Candilera G, Funaro D, Pompili M, Kaplan KJ, Markus-Kaplan M. Hopelessness, temperament, anger and interpersonal relationships in Holocaust (shoah) survivors' grandchildren. *Journal of Religion and Health*. 2011;50(2):321-9.
9. Yehuda R, Halligan SL, Grossman R. Childhood trauma and risk for PTSD: relationship to intergenerational effects of trauma, parental PTSD, and cortisol excretion. *Developmental Psychopathology*. 2001;13(3):733-53.
10. Becker I. Uses of yoga in psychiatry and medicine. In: Muskin PR, ed. *Complementary and Alternative Medicine and Psychiatry*. Review of Psychiatry Volume 19, Oldham JM and Riba MB, Series eds. Washington DC: American Psychiatric Press, Inc.; 2000;19:107-145.
11. Brown RP, Gerbarg PL. Yoga breathing, meditation, and longevity. In: Bushness C, Olivo E, and Theise N, eds. *Longevity, Regeneration, and optimal health, integrating Eastern and Western perspectives*. *Annals of the New York Academy of Sciences*. 2009;1172:54-62.
12. Brown RP, Gerbarg PL. Sudarshan kriya yoga breathing in the treatment of stress, anxiety, and depression. Part II. Clinical Applications and Guidelines. *Journal of Alternative and Complementary Medicine*. 2005b;11:711-717.
13. Brown RP, Gerbarg PL, Muskin PR. *How to Use Herbs, Nutrients, and Yoga in Mental Health Care*. New York: W.W. Norton, 2009:71-139.
14. Carter JJ, Gerbarg PL, Brown RP, Ware R. Multi-component yoga breath program for Vietnam veteran posttraumatic stress disorder: randomized controlled trial. *International Journal of Yoga Therapy*. 2009;(Suppl):40.
15. Franzblau SH, Smith M, Echevarria S, Van Cantford TE. Take a breath, break the silence: the effects of yogic breathing and testimony about battering on feelings of self-efficacy in battered women. *International Journal of Yoga Therapy*. 2006;16:49-57.
16. Gerbarg PL: Yoga and neuro-psychoanalysis. In: *Bodies in Treatment: The Unspoken Dimension*. FS Anderson, ed. Inc. Hillsdale, NJ: The Analytic press; 2008:127-150.
17. Janakiramaiah N, Gangadhar BN, Naga Venkatesha Murthy PJ, et al. Antidepressant efficacy of sudarshan kriya yoga (SKY) in melancholia: a randomized comparison with electroconvulsive therapy (ECT) and imipramine.

Journal of Affective Disorders. 2000;57:255-259.

18. Katzman M, Vermani M, Gerbarg PL et al. Art of Living course (SKY) as adjunctive treatment in GAD. Albuquerque, NM: Anxiety Disorders Association of America, March 10-12 2009.
19. Khalsa SB, Shorter SM, Cope S, Wyshak G, Sklar E. Yoga ameliorates performance anxiety and mood disturbance in young professional musicians. *Applied Psychophysiology and Biofeedback*. Dec 2009;34(4):279-89.
20. Sageman S. Breaking through the despair: Spiritually oriented group therapy as a means of healing women with severe mental illness. *Journal of the American Academy of Psychoanalytic Dynamic Psychiatry*. 2004;32:125-41.
21. Shapiro D, Cook IA, Davydov DM, Ottaviani C, Leuchter AF, Abrams M. Yoga as a complementary treatment of depression: effects of traits and moods on treatment outcome. *Evidence-Based Complementary and Alternative Medicine*. 2007;4(4):493-502.
22. Van der Kolk BA. Clinical implications of neuroscience research in PTSD. *Annals of the New York Academy of Sciences*. 2006. 1071:277-93.
23. Mollica RF, Cardozo BL, Osofsky HJ, Raphael B, Ager A, Salama P. Mental health in complex emergencies. *Lancet*. 2004;364:2058-2067.
24. Mollica RF, Wyshak G, Lavelle J. The psychosocial impact of war trauma and torture on Southeast Asian refugees. *American Journal of Psychiatry*. 1987;144(12):1567-72.
25. Grodin MA, Piwowarczyk L, Fulker D, Bazazi AR, Saper RB. Treating survivors of torture and refugee trauma: a preliminary case series using qigong and tai chi. *Journal of Alternative and Complementary Medicine*. 2008;14(7):801-806.
26. Meffert SM, Marmar CR. Darfur refugees in Cairo: mental health and interpersonal conflict in the aftermath of genocide. *Journal of Interpersonal Violence*. 2009;24(11):1835-48.
27. Mollica RF. *Healing Invisible Wounds. Paths to Hope and Recovery in a Violent World*. New York: Harcourt Inc.; 2006.
28. Gordon JS, Staples JK, Blyta A, Bytyqi M, Wilson AT. Treatment of posttraumatic stress disorder in postwar Kosovar adolescents using mind-body skills groups: A randomized controlled trial. *Journal of Clinical Psychiatry*. 2008;69(9):1469-76.
29. Telles S, Naveen KV, Dash M. Yoga reduces symptoms of distress in tsunami survivors in Andaman Islands. *Evidence-Based Complementary and Alternative Medicine*. 2007;4:503-509.
30. Telles S, Singh N, Joshi M, Balkrishna A. Posttraumatic stress symptoms and heart rate variability in Bihar flood survivors following yoga: A randomized controlled study. *BioMed Central Psychiatry*. 2010;10:18.
31. Descilo T, Vedamurtachar A, Gerbarg PL, Nagaraja D, Gangadhar BNG, Damodaran B, Adelson B, Braslow LH, Marcus M, Brown RP. Effects of a yoga breath intervention alone and in combination with an exposure therapy for posttraumatic stress disorder and depression in survivors of the 2004 South-East Asia tsunami. *Acta Psychiatrica Scandinavica*. 2010;121(4):289-300.
32. Fehmi L, Robbins C. *The Open Focus Brain*, Boston, MA: Trumpeter Press; 2007.
33. Bernardi L, Porta C, Gabutti A, Spicuzza L, Sleight P. Modulatory effects of respiration. *Autonomic Neuroscience*. 2001;90(1-2):47-56.
34. Lehrer, P, Sasaki Y, Saito, Y. 1999. Zazen and cardiac variability. *Psychosomatic Medicine*. 61:812-821.
35. Karavidas MK, Lehrer PM, Vaschillo E, Vaschillo B, Marin H, Buyske S, Malinovsky I, Radvanski D, Hassett A. Preliminary results of an open label study of heart rate variability biofeedback for the treatment of major depression. *Applied Psychophysiology and Biofeedback*. 2007;32(1):19-30.
36. Brown RP, Gerbarg PL. Sudarshan Kriya Yoga Breathing in the treatment of stress, anxiety, and depression. Part I. Neurophysiological model. *Journal of Alternative and Complementary Medicine*. 2005a;11:189-201.
37. Katzman M, Vermani M, Gerbarg PL, and Brown RP. Effect of Breath Body Mind workshop on symptoms of GAD with comorbidities. Honolulu, Hawaii: American Psychiatric Association, May 15, 2011.
38. Brown RP, Gerbarg PL, Vermani M, Katzman. 1st trial of breathing, movement, and meditation on PTSD, depression, and anxiety related to September 11th New York City World Trade Center Attacks. American Psychiatric Association, New Orleans, LA, May 22, 2010.
39. Brown RP, Gerbarg PL, Vermani M, Katzman. 2nd trial of breathing, movement, and meditation on PTSD, depression, and anxiety related to September 11th New York City World Trade Center Attacks. American Psychiatric Association, New Orleans, LA, May 22, 2010.
40. Boris NW, Thurman TR, Snider L, Spencer E, Brown L. Infants and young children living in youth-headed households in Rwanda: implications of emerging data. *Infant Mental Health Journal*. 2006;27(6):584-602.
41. Beauchaine T. Vagal tone, development, and Gray's motivational theory: toward an integrated model of autonomic nervous system functioning in psychopathology. *Developmental Psychopathology*. 2001;13:183-214.
42. Friedman BH, Thayer JE. Autonomic balance revisited: panic anxiety and heart rate variability. *Journal of Psychosomatic Research*. 1998;44:133-51.
43. Sahar T, Shalev AY, Porges SW. Vagal modulation of responses to mental challenge in posttraumatic stress disorder. *Biological Psychiatry*. 2001;49(7):637-43.
44. Hopwood S, Bryant RA. Intrusive experiences and hyperarousal in acute stress disorder. *British Journal of Clinical Psychiatry*. Mar 2006;45(Pt 1):137-42.
45. Hornsveid H, Garssen B, van Spiegel P. Voluntary hyperventilation: the influence of duration and depth on the development of symptoms. *Biological Psychology*. Jun 1995;40(3):299-312.
46. Nixon RD, Bryant RA. Induced arousal and reexperiencing in acute stress disorder. *Journal of Anxiety Disorders*. 2005;19(5):587-94.
47. Spinhoven P, Onstein EJ, Sterk PJ, Le Haen-Versteijnen D. The hyperventilation provocation test in panic disorder. *Behavioral Research and Therapy*. 1992;30(5):453-61.
48. Sikter A, Faludi G, Rihmer Z. The role of carbon dioxide (and intracellular pH) in the pathomechanism of several mental disorders. Are the diseases of civilization caused by learnt behaviour, not the stress itself? *Neuropsychopharmacologia Hungarica*. 2009;11(3):161-73.
49. Larsen S, Yee W, Gerbarg PL, Brown RP, Gunkelman J, Sherlin L. Neurophysiological markers of sudarshan kriya yoga practices: a pilot study. *Proceedings World Conference Expanding Paradigms: Science, Consciousness and Spirituality*. All India Institute of Medical Sciences. New Delhi, India. Feb 2006:36-48.
50. Larsen S, Yee W, Gerbarg PL, Brown RP, Gunkelman J, Sherlin L. Neurophysiological markers of sudarshan kriya yoga. In: *Yoga in Psychiatry: Theory, Clinical Applications, and Beginning Practice*. Toronto, Canada. American Psychiatric Association Annual Meeting. May 20-25, 2006.
51. Raghuraj P, Ramakrishnan AG, Nagendra HR, Telles S. Effect of two selected yogic breathing techniques of heart rate variability. *Indian Journal of Physiology and Pharmacology*. 1998;42(4):467-72.
52. Stancák A Jr, Kuna M, Srinivasan, Dostalek C, Vishnudevananda S. Kapalabhati-yoga cleansing exercise: II, EEG topography analysis. *Homeostasis in Health and Disease*. 1991;33:182-9.
53. Telles S, Raghuraj P, Arankalle D, Naveen KV. Immediate effect of high frequency yoga breathing on attention [Letter]. *Indian Journal of Medical Science*. 2008;62(1):20-22.
54. Sezibera, V. PTSD and comorbidity. Presented at Discussing Trauma: the International Symposium on the Genocide Perpetrated Against Tutsi & the 2010 Commemoration Period. Kigali, Rwanda: Serena Hotel, April 4-6th, 2010.
55. Kezio-Musoke D. Genocide survivors object to the airing of horror clips. <http://al-lafkia.com/stories/201004130775.html>. Posted April 12, 2010. Accessed Jan 20, 2011.
56. Tempny A. What research tells us about the mental health and psychosocial well-being of Sudanese refugees: a literature review. *Transcultural Psychiatry*. 2009;46(2):300-15.
57. Van Demoot Lipsky L, Burk C. *Trauma stewardship: an everyday guide to caring for self while caring for others*. San Francisco, CA: Berrett-Koehler Publishers, Inc.; 2009.

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