



Brigham & Women's Hospital

Harvard Medical School



Yoga for Depression

Yoga Alliance Webinar

April 23, 2020



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Major Depressive Disorder (MDD)

DSMV Criteria

(Diagnostic & Statistical Manual of Mental Disorders, 5th Ed)

5 or more symptoms for 2-weeks including symptom #1 or #2 below and clinically significant distress/impairment in overall functioning

1. Depressed mood (sad, empty, hopeless)
2. Loss of interest/pleasure in daily activities
3. Weight or appetite change
4. Sleep disturbance
5. Psychomotor agitation or retardation
6. Fatigue or loss of energy
7. Feelings of worthlessness or guilt
8. Difficulty with concentration or indecisiveness
9. Suicidal ideation

Sadness or Depressed Mood

- Short term or temporary
- Specific to a life event or circumstance
- There is still interest/pleasure in other activities
- No serious disruption of sleeping and eating patterns
- No self-diminishing negative thought patterns
- No suicidal ideation

Etiology of Depression

- biological
- genetic
- environmental
- childhood or developmental events
- stressful life events
- severe and prolonged stress

Stress and Depression

“Research has supported a strong association between stress and depression...

...higher levels of significant stressors prior to the onset of major depressive episodes in patients...

...stressors were 2.5 times more likely in depressed patients...

... in community samples, 80% of depressed cases were preceded by major life events...most episodes of major depression are preceded by stressful life events”

From: Stress and depression. Hammen C. Annual Review of Clinical Psychology 1:293-319, 2005.

Stress and Depression

“...chronic stress (defined as stress ongoing for more than 12 months) is a stronger predictor of depressive symptoms than acute stressors.”

“Other research has found that continuing adverse conditions, such as poverty, medical disabilities, and lasting marital discord, are associated with risk for depression.”

From: Stress and depression. Hammen C. Annual Review of Clinical Psychology 1:293-319, 2005.

Treatments for Depression

- Pharmaceuticals
- Psychotherapy
- Cognitive Behavioral Therapy
- Exercise
- Relaxation Therapy
- Meditation
- Yoga

Yoga Practices

Postures, Breathing, Relaxation, Meditation



Yoga Treatment of Depression

Mechanisms of Action

- Decreasing rumination
- Promoting decrease in stress reactivity
- Regulating neurotransmitters
- Promoting more adaptive thinking
- Promoting behavioral activation
- Increasing sleep regulation

From: Hatha yoga for depression: critical review of the evidence for efficacy, plausible mechanisms of action, and directions for future research, Uebelacker LA, Epstein-Lubow G, Gaudiano BA, Tremont G, Battle CL, Miller IW, Journal of Psychiatric Practice, 16:22-33, 2010.

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"Yoga for Depression is a godsend: beautifully written, medically accurate, and very practical. I highly recommend it!"—Christiane Northrup, M.D., author of *Women's Bodies, Women's Wisdom*

A Compassionate
Guide to Relieve
Suffering
Through Yoga

Yoga for Depression

AMY WEINTRAUB

Foreword by Stephen Cope

Preface by Richard Brown, M.D.

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"Donna's clear, simple, and economical instruction is accessible to everyone. Here is the voice of a good friend: encouraging, practical, wise, and always very real."
—Hillary Dowdle, Editor-in-Chief, Yoga Journal

yoga beats the blues



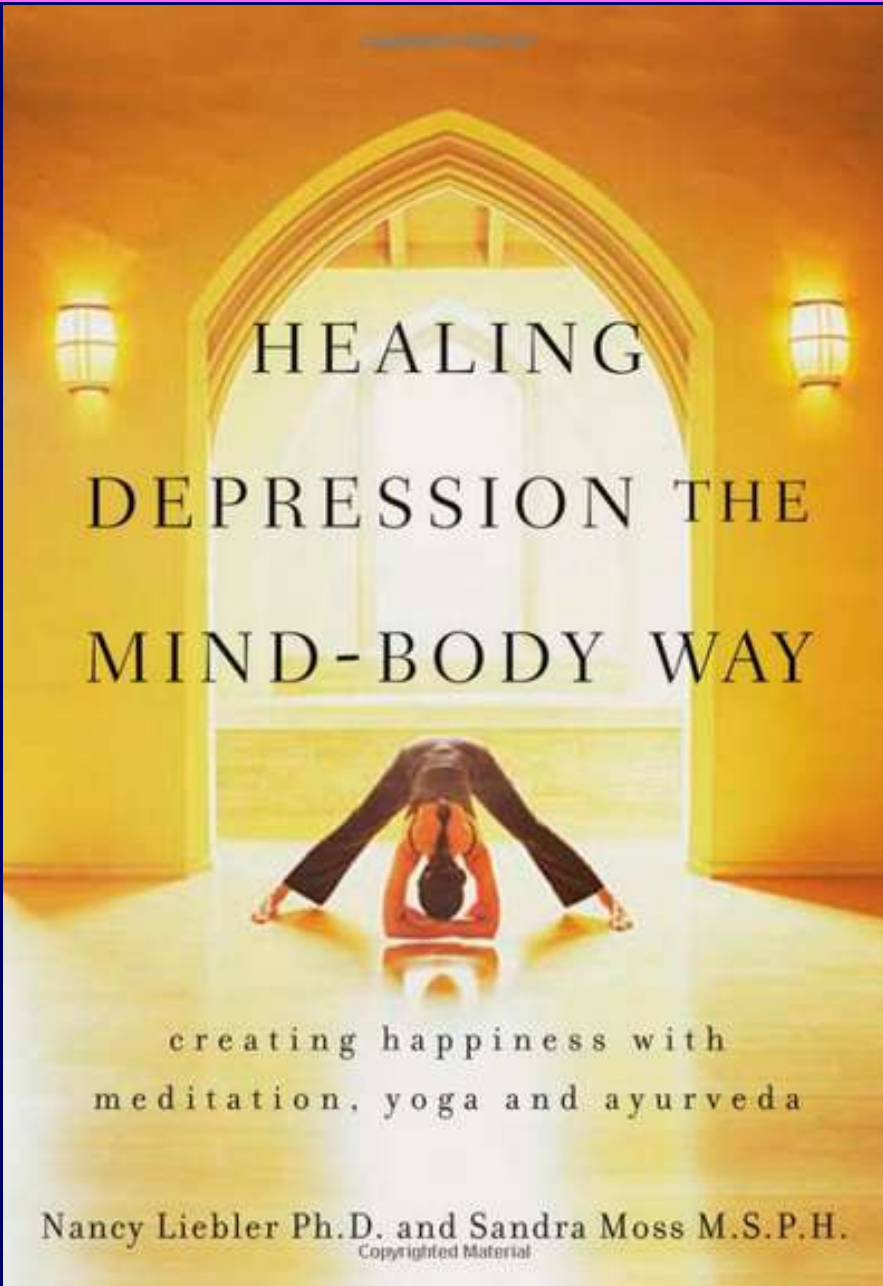
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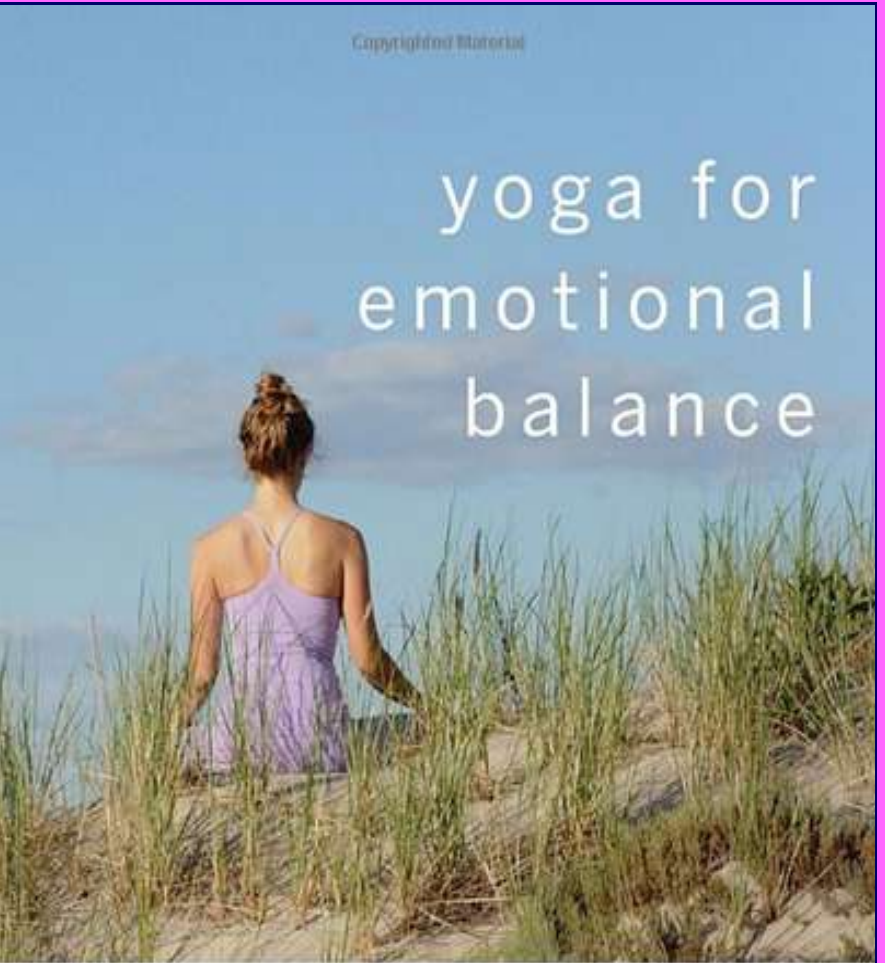
HEALING DEPRESSION THE MIND-BODY WAY

creating happiness with
meditation, yoga and ayurveda

Nancy Liebler Ph.D. and Sandra Moss M.S.P.H.

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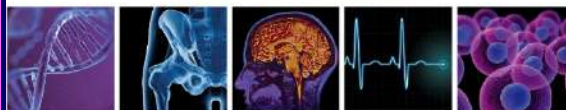


yoga for emotional balance

simple practices to
help relieve anxiety and depression

bo forbes, PsyD

THE PRINCIPLES AND PRACTICE OF YOGA IN HEALTH CARE



Sat Bir Khalsa • Lorenzo Cohen
Timothy McCall • Shirley Telles



THE PRINCIPLES AND PRACTICE OF YOGA IN HEALTH CARE



The Principles and Practice of Yoga in Health Care is a professional-level textbook with contributions by multiple expert researchers and therapists in the field.

- This book:**
- brings together the science and the practice of yoga therapy
 - supports the emergence of yoga therapy as a credible profession
 - comprehensively summarizes research findings and their practical implications for professionals who use yoga in their practice
 - includes chapter introductions by leading biomedical researchers of yoga
 - reviews the scientific evidence base for yoga for a wide variety of medical conditions
 - provides brief contributions by expert yoga therapists describing practical implementation issues relevant to yoga for specific conditions

The editors include three eminent yoga therapy researchers and one seasoned practitioner in the field. They have brought together an experienced team of researchers and yoga therapist contributors.

This book will prove essential for yoga therapists, physical therapists, medical doctors, psychologists and other health professionals interested in yoga as a therapeutic intervention.

THE PRINCIPLES AND PRACTICE OF YOGA IN HEALTH CARE

Khalsa et al.

CHAPTER FIVE YOGA THERAPY FOR DEPRESSION

L UEBELACKER • H LAVRETSKY • G TREMONT

Pathophysiology, etiology, and prevalence of depression

Definition and prevalence

Major depressive disorder (MDD) is defined as a period of 2 weeks or longer in which there is depressed mood or loss of interest or pleasure and at least four other symptoms involving changes in weight/appetite, sleep, activity level, energy, self-image, concentration, or suicidality. To meet diagnostic criteria, these symptoms must significantly impair social, occupational, or other functioning. MDD is one of the most common psychiatric conditions, estimated to affect 350 million individuals worldwide (World Health Organization, 2010). In 2012, 16 million adults in the United States had at least one depressive episode within the past year (Substance Abuse and Mental Health Services Administration, 2012). It is estimated that 20% of women and 12% of men will experience major depression in their lifetime.

Etiology and pathophysiology

Major depression is a complex biopsychosocial disorder, frequently co-occurs with anxiety disorders and substance use disorders (Kessler et al., 2003), and is likely clinically and etiologically heterogeneous (Hasler, 2010). Thus, many etiological hypotheses have been proposed. Considerable evidence suggests that alterations in metabolism of neurotransmitters such as serotonin, norepinephrine, or dopamine in the brain underlie the pathophysiology of depression (Belmaker & Agam, 2008). There is also evidence that acute depression is associated with decreased total gamma-aminobutyric acid (GABA) in the prefrontal and occipital cortex (Hasler et al., 2007). GABA is the primary inhibitory neurotransmitter in the brain.

Chronic stress (Roy & Campbell, 2013) and impaired emotion regulation (Compare, Zarbo, Shonin,

Van Gordon, & Marconi, 2014)—which affects how one copes with stress—are risk factors for MDD. Thus, MDD is considered to be a stress-related disorder, and some individuals show dysfunction of the hypothalamic-pituitary-adrenal (HPA) axis and have heightened levels of the stress hormone cortisol (Pariante & Lightman, 2008). High levels of cortisol release and abnormalities in the stress response are hypothesized to account for associations between volume loss in the hippocampus (an important brain structure for learning and memory) and longer durations of episodes of depression (Sheline, Gado, & Kraemer, 2003). Relatedly, inflammatory-response activation has been implicated in depression. Elevated levels of proinflammatory cytokines, such as interleukin-1, interleukin-6, and tumor necrosis factor alpha, are seen in depression and associated with activation of the HPA axis and disruption of the central serotonin system (Dantzer, O'Connor, Freund, Johnson, & Kelley, 2008).

Genetic factors and heritability are implicated in depression. Estimates suggest that genes account for 30–40% of the variance in susceptibility to MDD, although there is little evidence for specific genes or gene-by-environment interactions (Donnelly, 2008; Kendler, Gardner, & Prescott, 2006). Environmental factors are also likely to increase susceptibility to or precipitate MDD. Specific environmental factors may include childhood traumatic events, interpersonal difficulties, interpersonal loss, isolation, and ongoing stressors. Psychological factors, such as increased anxiety and tendency to interpret events in negative ways, may also be related to depression. Similarly, cognitive biases and deficits in cognitive control may be associated with poor emotion regulation and are common in depressive disorders, and therefore could have implications for treatment strategies (Joormann & Quinn, 2014).

**YOGA FOR DEPRESSION: A SYSTEMATIC REVIEW
AND META-ANALYSIS**

Holger Cramer, Ph.D.,* Romy Lauche, Ph.D., Jost Langhorst, M.D., and Gustav Dobos, M.D.

“Yoga, in particular meditation-based yoga forms seem to be effective for treating depression... yoga, especially meditation-based yoga forms, could be considered an ancillary treatment option for patients....”



Contents lists available at ScienceDirect

Journal of Psychiatric Research

journal homepage: www.elsevier.com/locate/psychires



A systematic review of randomised control trials on the effects of yoga on stress measures and mood



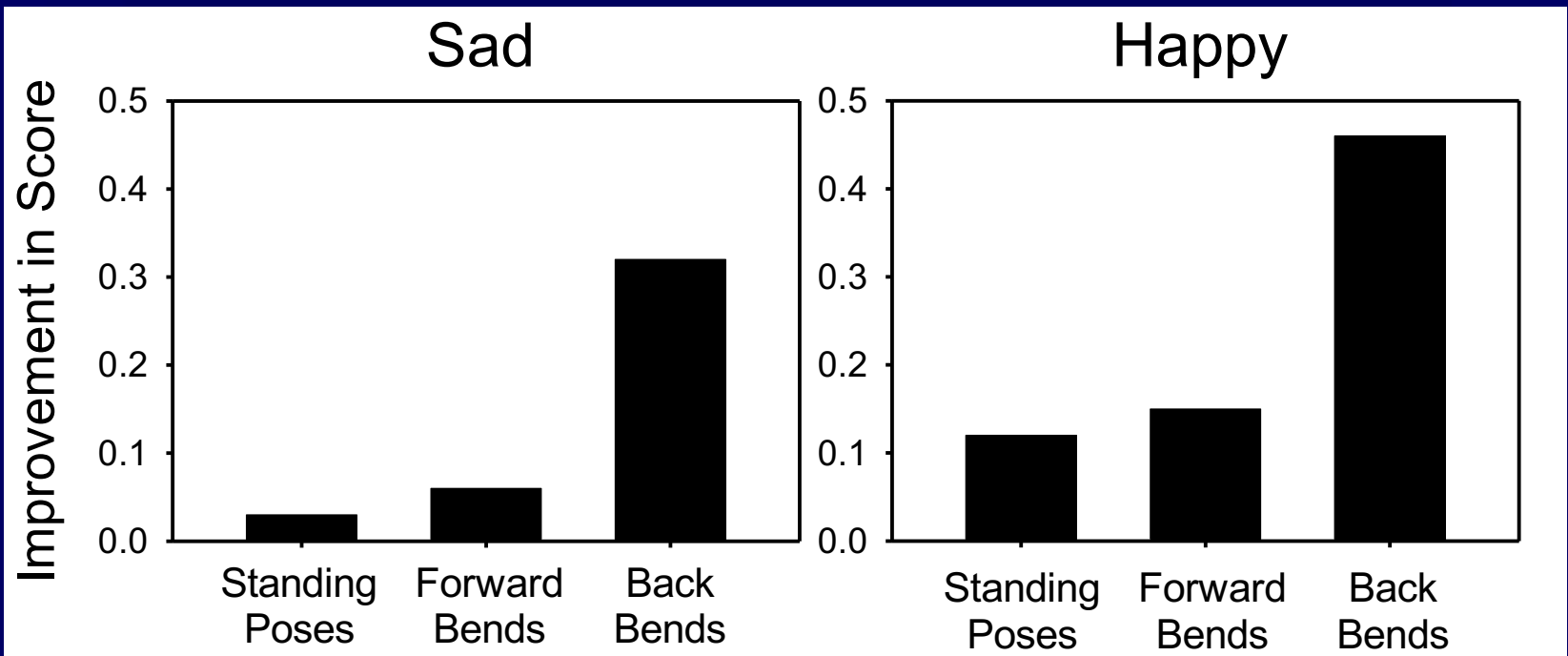
Michaela C. Pascoe^{a,*}, Isabelle E. Bauer^b

^a Institute of Neuroscience and Physiology, Dept. of Clinical Neuroscience and Rehabilitation, Sahlgrenska Academy at University of Gothenburg, Sweden

^b University of Texas Health Science Center, Department of Psychiatry and Behavioral Science, Houston, TX, USA

“...the 25 randomised control studies discussed provide preliminary evidence to suggest that yoga practice leads to better regulation of the sympathetic nervous system and hypothalamic-pituitary-adrenal system, as well as a decrease in depressive and anxious symptoms in a range of populations.”

Specificity of Yoga Postures



Specific poses resulted in differences in how moods were affected, with back bends associated with greater increases in positive moods.

The specific and nonspecific effects of different bodily postures and movements on psychological processes in Yoga ...deserve further study.

From: *Mood Changes Associated with Iyengar Yoga Practices: A Pilot Study*, Shapiro D, Cline K, *International Journal of Yoga Therapy* 14:35-44, 2004.

Yoga, Thalamic GABA, Mood & Anxiety

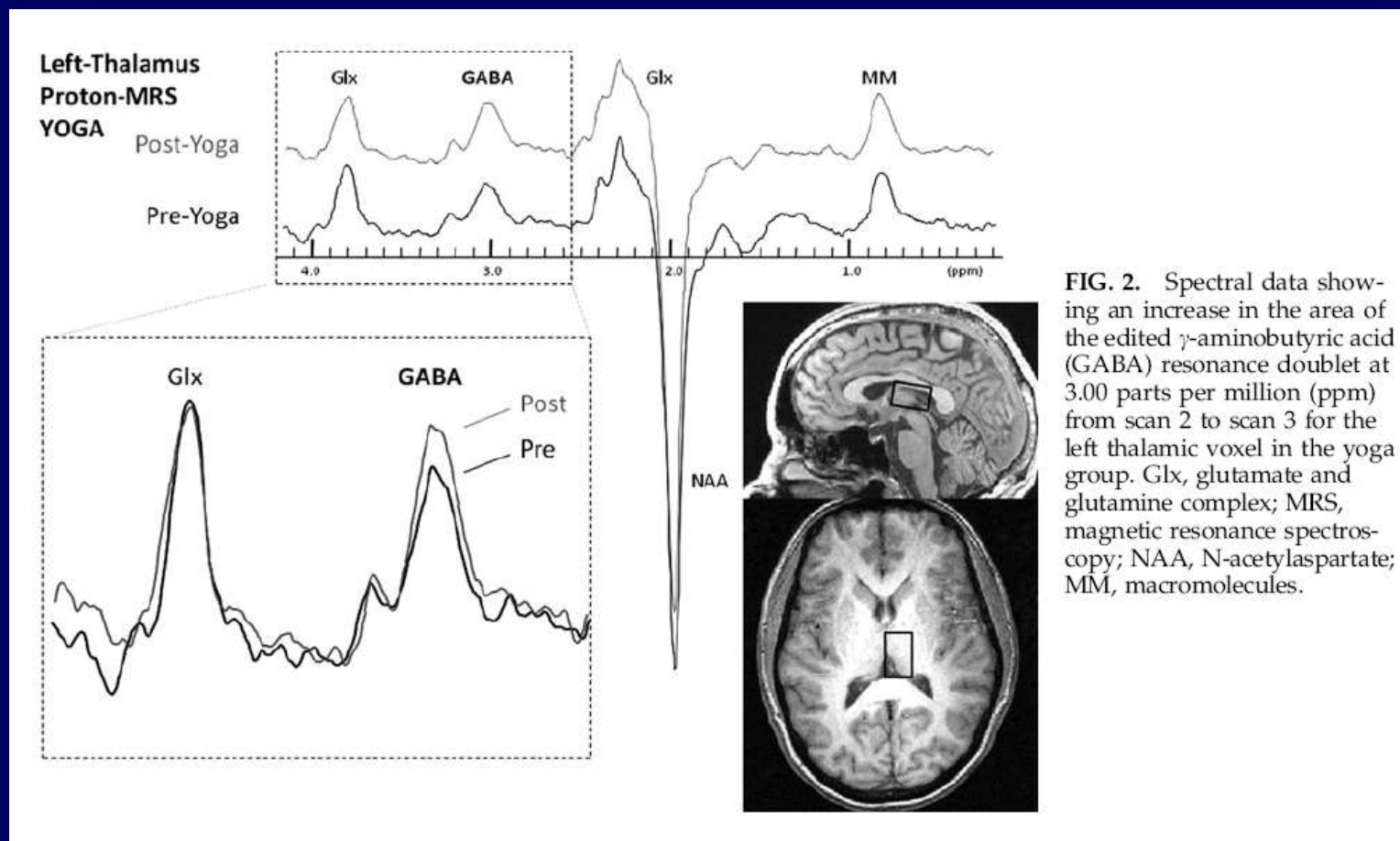
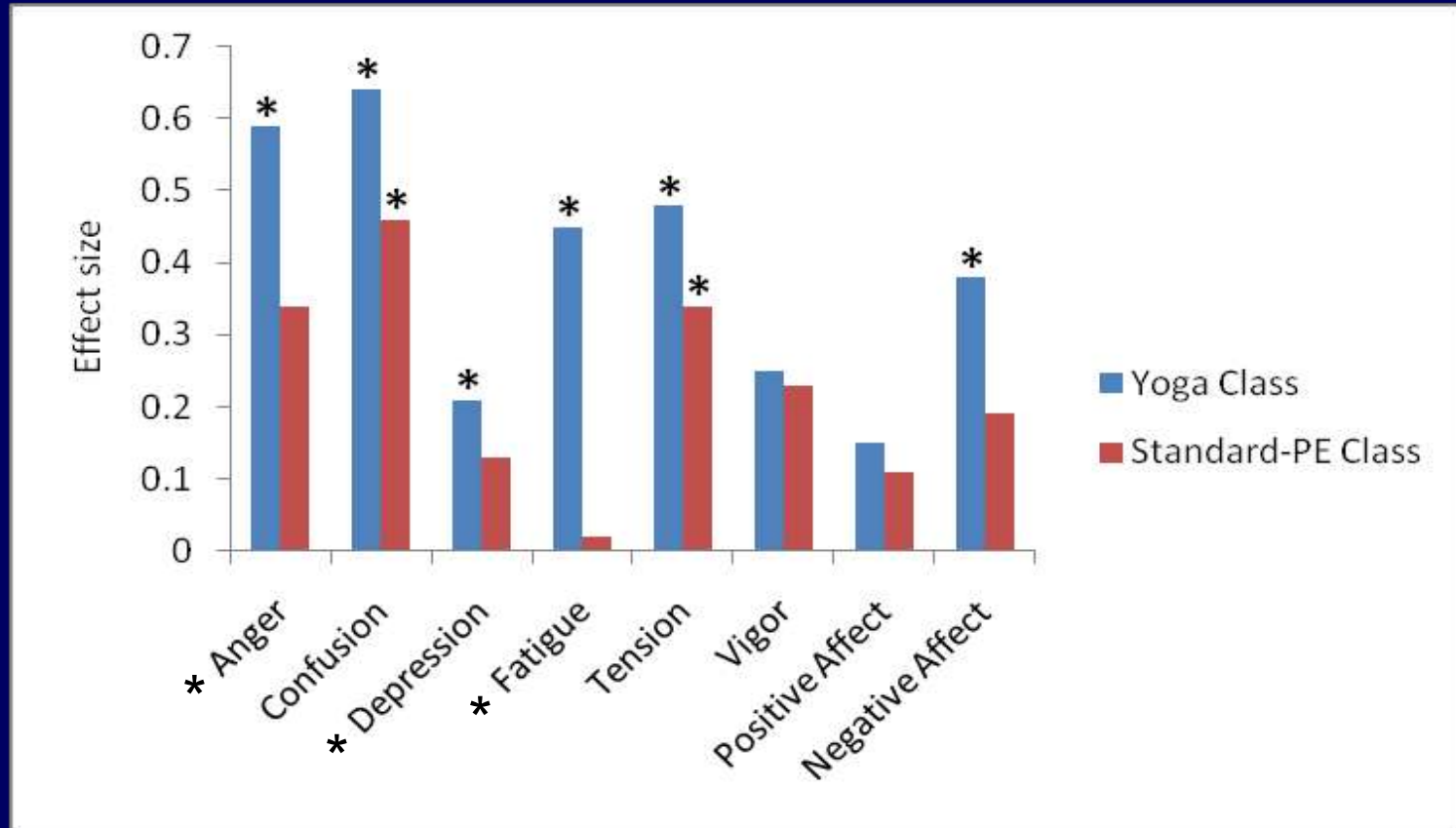


FIG. 2. Spectral data showing an increase in the area of the edited γ -aminobutyric acid (GABA) resonance doublet at 3.00 parts per million (ppm) from scan 2 to scan 3 for the left thalamic voxel in the yoga group. Glx, glutamate and glutamine complex; MRS, magnetic resonance spectroscopy; NAA, N-acetylaspartate; MM, macromolecules.

From: *Effects of yoga versus walking on mood, anxiety, and brain GABA levels: a randomized controlled MRS study*, Streeter CC, Whitfield TH, Owen L, Rein T, Karri SK, Yakhkind A, Perlmutter R, Prescott A, Renshaw PF, Ciraulo DA, Jensen JE. *Journal of Alternative and Complementary Medicine*, 16:1145-52, 2010.

Single Session - Yoga vs. PE



From: *Yoga in public school improves adolescent mood and affect.* Felver JC, Butzer B, Olson KJ, Smith IM, Khalsa SB. *Contemporary School Psychology*, 19:184-192, 2015

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4605219/pdf/nihms679030.pdf>

BMJ Open Yoga practice in the UK: a cross-sectional survey of motivation, health benefits and behaviours

Tina Cartwright ¹, Heather Mason,² Alan Porter,¹ Karen Pilkington^{1,3}

BMJ

Cartwright T, et al. *BMJ Open* 2020;**10**:e031848. doi:10.1136/bmjopen-2019-031848

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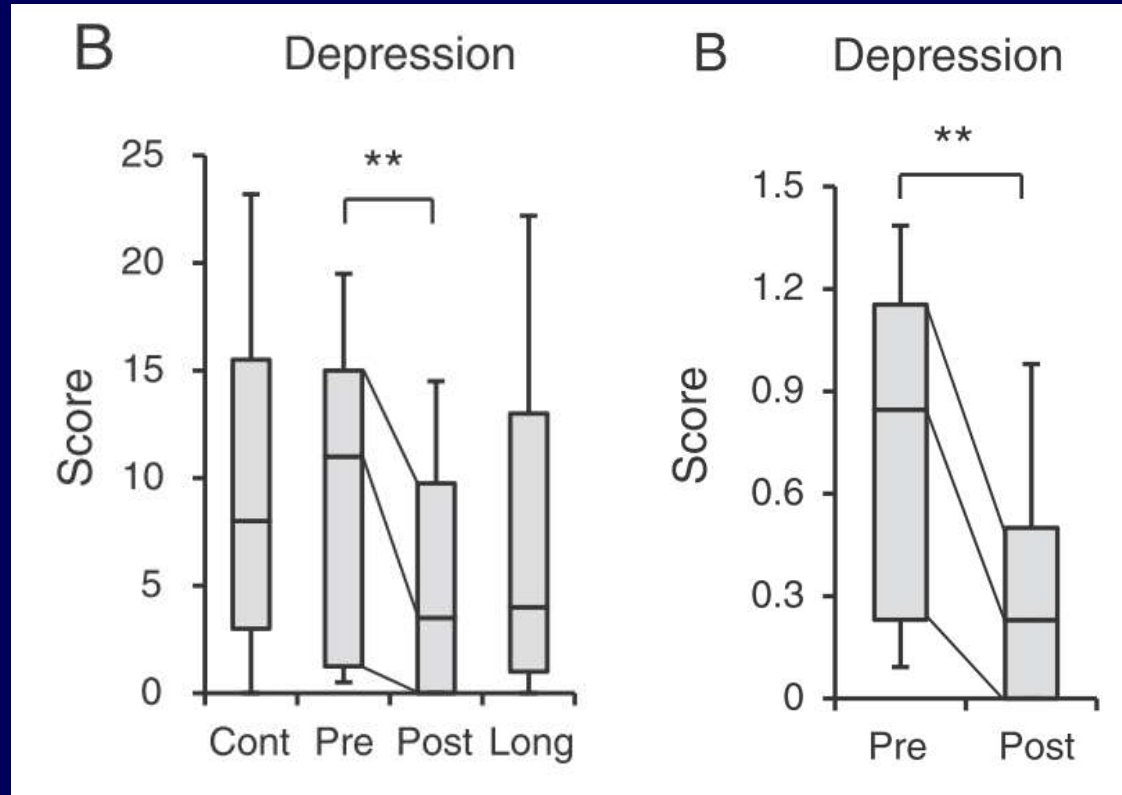
Table 3 Perceived helpfulness in managing health issues and conditions

Condition	n*	Helpful (%)	Neither helpful nor unhelpful	Unhelpful (%)
Mental health				
Stress	997	98.4	1.4	0.2
Anxiety	712	96.8	2.9	0.2
Depression	513	93.2	5.5	1.4

*Number stating they had experienced the health condition/issue before or since practising yoga. Only conditions with responses greater than 50 (n) are included.

<https://bmjopen.bmj.com/content/bmjopen/10/1/e031848.full.pdf>

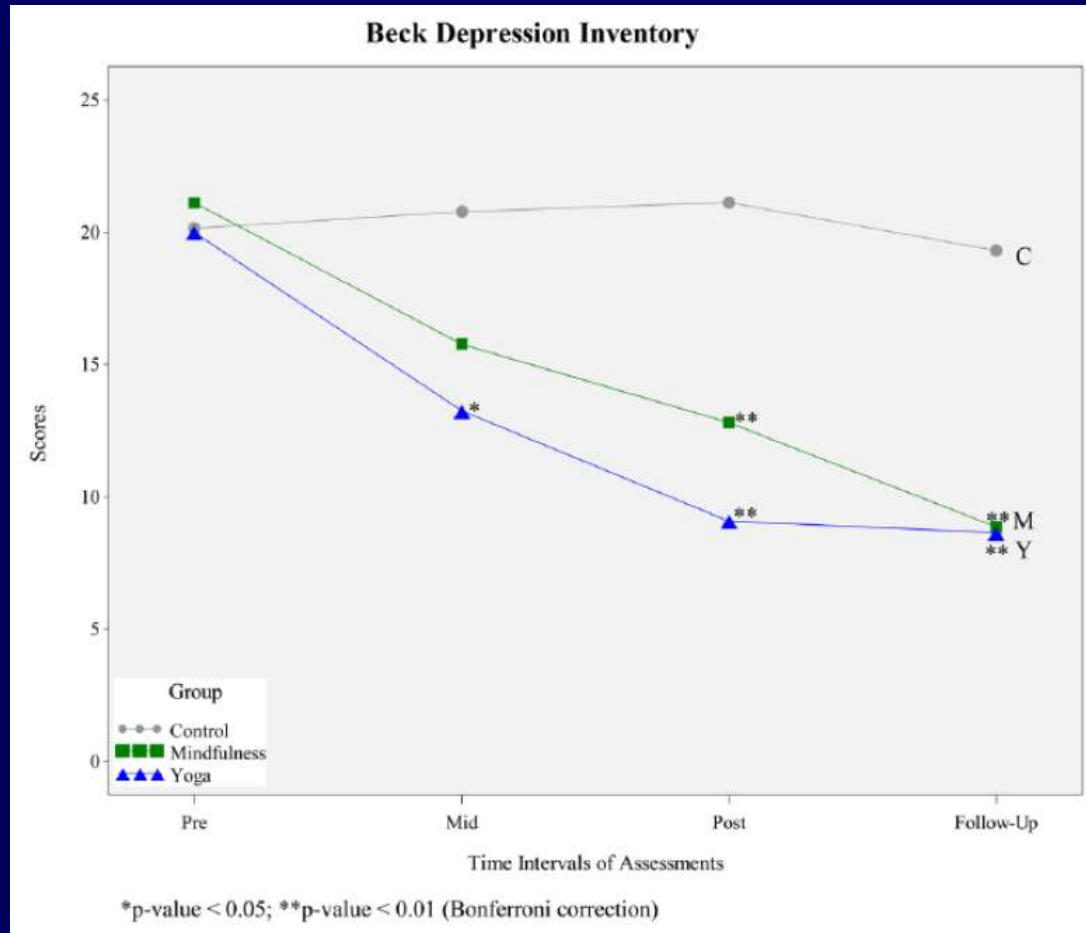
Yoga Training in Healthy Women



From: *Effect of 12 weeks of yoga training on the somatization, psychological symptoms, and stress-related biomarkers of healthy women.* Yoshihara K, Hiramoto T, Oka T, Kubo C, Sudo N, *Biopsychosocial Medicine*, 8(1):1, 2014.

<https://bpsmedicine.biomedcentral.com/track/pdf/10.1186/1751-0759-8-1>

Yoga in Students



From: *A Randomized Controlled Trial of Mindfulness Versus Yoga: Effects on Depression and/or Anxiety in College Students*. Falsafi N, *Journal of the American Psychiatric Nurses Association*, 22:483-497, 2016.

Yoga, Meditation and Mind-Body Health: Increased BDNF, Cortisol Awakening Response, and Altered Inflammatory Marker Expression after a 3-Month Yoga and Meditation Retreat

B. Rael Cahn^{1,2}, Matthew S. Goodman³, Christine T. Peterson^{4,5}, Raj Maturi^{6,7} and Paul J. Mills⁴*

TABLE 2 | Psychometrics pre- and post-retreat.

N = 34	Pre mean (SD)	Post mean (SD)	p
BSI-18 Total	10.5 (11.0)	4.12 (6.00)	<0.0001
BSI-Depression	3.09 (4.39)	1.26 (1.96)	<0.01
BSI-Anxiety	3.76 (4.20)	1.21 (2.07)	<0.0001
BSI-Somatic	3.67 (3.62)	1.65 (2.83)	<0.0001
Freiburg mindfulness	39.6 (7.65)	44.5 (7.07)	<0.0001
Tellegen absorption	88.6 (29.6)	91.3 (28.9)	0.4

Yoga for reducing perceived stress and back pain at work

Occupational Medicine 2012;62:606–612

Advance Access publication 25 September 2012 doi:10.1093/occmed/kqs168

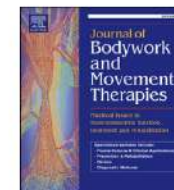
N. Hartfiel¹, C. Burton², J. Rycroft-Malone², G. Clarke³, J. Havenhand⁴, S. B. Khalsa⁵ and R. T. Edwards¹

¹Centre for Health Economics and Medicines Evaluation, Bangor University, Bangor, Gwynedd, UK, ²Centre for Health-Related Research, Bangor University, Bangor, Gwynedd, UK, ³School of Healthcare Sciences, Bangor University, Bangor, Gwynedd, UK,

⁴Department of Marine Ecology, Göteborg University, Stromstad, Sweden, UK, ⁵Department of Medicine, Harvard Medical School, Boston, USA.

Table 3. Mean scores, *P*-values and *Q*-values from univariate ANOVA and multiple regression analysis of RMDQ, PSS and PANAS-X

Domains	Yoga (<i>n</i> = 33)		Control (<i>n</i> = 26)		<i>F</i> -ratio	<i>P</i> -value (unadjusted)		<i>Q</i> -value (adjusted)	
	Baseline	End	Baseline	End		Yoga vs. control		Yoga vs. control	
	Mean (SE)	Mean (SE)	Mean (SE)	Mean (SE)					
Back pain (RMDQ)	0.79 (0.32)	0.27 (0.15)	1.08 (0.37)	1.73 (0.51)	10.20	<i>P</i> < 0.01		<i>Q</i> < 0.01**	
Perceived stress (PSS)	24.00 (0.95)	21.30 (0.93)	25.70 (1.62)	25.40 (1.30)	7.64	<i>P</i> < 0.01		<i>Q</i> < 0.05*	
Well-being (PANAS-X)	210.20 (4.72)	233.40 (4.88)	203.10 (6.98)	205.80 (6.40)	15.40	<i>P</i> < 0.001		<i>Q</i> < 0.01**	
1. Serenity	8.28 (0.43)	11.09 (0.40)	8.23 (0.55)	8.62 (0.49)	21.37	<i>P</i> < 0.001		<i>Q</i> < 0.01**	
2. Reduced hostility	25.71 (0.63)	27.45 (0.43)	24.85 (0.94)	24.52 (0.88)	14.08	<i>P</i> < 0.001		<i>Q</i> < 0.01**	
3. Self-assured	14.78 (0.71)	18.69 (0.84)	13.36 (1.02)	14.00 (1.00)	11.83	<i>P</i> < 0.01		<i>Q</i> < 0.01**	
4. Reduced sadness	19.61 (0.72)	22.09 (0.60)	20.12 (1.01)	19.73 (1.01)	11.59	<i>P</i> < 0.01		<i>Q</i> < 0.01**	
5. Attentiveness	11.97 (0.51)	13.84 (0.51)	11.77 (0.54)	12.12 (0.59)	7.26	<i>P</i> < 0.01		<i>Q</i> < 0.05*	
6. Jovial	23.43 (1.01)	27.03 (1.13)	23.54 (1.13)	23.58 (1.11)	5.27	<i>P</i> < 0.05		NS	
7. Reduced fatigue	12.78 (0.62)	15.50 (0.59)	12.50 (0.70)	13.69 (0.58)	4.65	<i>P</i> < 0.05		NS	
8. Reduced fear	26.34 (0.71)	27.84 (0.49)	25.19 (1.07)	25.73 (1.01)	3.45	NS		NS	
9. Reduced shyness	17.32 (0.46)	17.52 (0.43)	16.73 (0.75)	16.31 (0.82)	1.71	NS		NS	
10. Reduced guilt	27.25 (0.60)	27.81 (0.52)	25.54 (0.88)	25.76 (0.94)	1.34	NS		NS	



Pilot Study

A randomized controlled pilot study of the effects of 6-week high intensity hatha yoga protocol on health-related outcomes among students

Marian E. Papp^{a, *}, Malin Nygren-Bonnier^c, Lennart Gullstrand^d, Per E. Wändell^a,
Petra Lindfors^b



Table 2
Associations (Pearsons r) between yoga dose and depression, sleep quality, and insomnia respectively after 6 weeks of high intensity yoga.

Outcome	Home training (HT) N = 21		Total yoga dose (TYD) N = 21	
	rp	p	rp	p
Depression	0.51	0.02*	0.47	0.03*
Sleep quality	0.55	0.01*	0.34	0.13
Insomnia	0.49	0.02*	0.40	0.08

Yoga (HIY). Home training (HT) and total yoga dose (TYD).

Total yoga dose = TYD, home training and attended yoga classes; rp = correlation (Pearson); p = p-value; min = minutes.

Depression = Hospital Anxiety and Depression Scale.

Sleep quality = Pittsburgh Sleep Quality Index; Insomnia = Insomnia Severity Index.

*p < 0.05, significant associations in bold.

Original Article

Yoga Reduces Symptoms of Distress in Tsunami Survivors in the Andaman Islands**Shirley Telles, K. V. Naveen and Manoj Dash**

Swami Vivekananda Yoga Research Foundation (A Yoga University), Bangalore, India

A month after the December 2004 tsunami the effect of a 1 week yoga program was evaluated on self rated fear, anxiety, sadness and disturbed sleep in 47 survivors in the Andaman Islands. Polygraph recordings of the heart rate, breath rate and skin resistance were also made. Among the 47 people, 31 were settlers from the mainland (i.e. India, ML group) and 16 were endogenous people (EP group). There was a significant decrease in self rated fear, anxiety, sadness and disturbed sleep in both groups, and in the heart and breath rate in the ML group, and in the breath rate alone in the EP group, following yoga ($P < 0.05$, t -test). This suggests that yoga practice may be useful in the management of stress following a natural disaster in people with widely differing social, cultural and spiritual beliefs.

Table 1. Self-rated indicators of distress and autonomic and respiratory variables in tsunami survivors after a week of yoga

Group	State	Self-rated indicators of distress				Autonomic and respiratory variables		
		Fear	Anxiety	Sadness	Disturbed sleep	Heart rate (beats/min)	Breath rate (breaths/min)	Skin Resistance (in k Ω)
Endogenous people $n = 16$	Pre-yoga	7.2 $\pm$ 2.3	7.4 $\pm$ 2.2	7.8 $\pm$ 2.5	6.8 $\pm$ 2.7	91.5 $\pm$ 6.3	26.5 $\pm$ 7.0	671.8 $\pm$ 742.8
	Post-yoga	3.5*** $\pm$ 2.2	4.7* $\pm$ 3.0	4.8*** $\pm$ 3.1	3.2*** $\pm$ 2.2	89.0 $\pm$ 12.7	20.9* $\pm$ 3.3	480.6 $\pm$ 520.6
Mainland settlers $n = 31$	Pre-yoga	7.3 $\pm$ 2.0	7.6 $\pm$ 1.7	7.8 $\pm$ 2.1	7.2 $\pm$ 2.2	88.1 $\pm$ 11.0	24.0 $\pm$ 7.1	394.9 $\pm$ 381.6
	Post-yoga	5.3*** $\pm$ 2.2	5.3*** $\pm$ 2.5	6.2*** $\pm$ 2.6	5.1*** $\pm$ 2.3	84.9 [#] $\pm$ 9.6	20.1*** $\pm$ 3.1	420.1 $\pm$ 383.9

[#] $P < 0.05$, one tailed, * $P < 0.05$; *** $P < 0.001$ t -test for paired data, two tailed.

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Scientific Research on Yoga

Substantial research has been done on many of the populations and parts of the body that COVID-19 preys on most. Use this section of Yoga Alliance's website to learn more about scientific research on the effects of yoga on the **elderly**, **respiratory function**, **anxiety**, and **depression**, to name a few.

Perhaps more than ever, yoga is being widely studied and evaluated for its positive effects and benefits. At Yoga Alliance, we curate the latest and most relevant research on yoga's applications in health, wellness, and disease. We have filtered it in a digestible manner for our Registered Yoga Schools and Registered Yoga Teachers as well as for the broader yoga community.

This evidence-based research not only reveals the science of yoga, it also explains its therapeutic efficacy when used in conjunction with conventional medicine. Our goal is that this impactful content will be utilized in a way that highlights even more of yoga's ancient, multi-faceted ability to improve lives.

Join us! Let us know how research on yoga is important or valuable to you on social media (@YogaAlliance) or by emailing us at research@yogaalliance.org. We honor and value your personal experiences and look forward to featuring your stories.

Our Research Conversation

Our Director of Yoga Research



Our Director of Yoga Research Dr. Sat Bir Singh Khalsa is a renowned yoga research expert and yoga teacher who has committed his professional life to clinical research surrounding yoga's full spectrum of healing efficacy.

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A Review Paper or Notable Publications.

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These citations were curated by Yoga Alliance's Director of Yoga Research, **Dr. Sat Bir Singh Khalsa**.

Main Research Categories



Basic Research



Special Populations



Disease and Disorders

Review Papers *(What's this?)*

Modern postural yoga as a mental health promoting tool: A systematic review.

Domingues RB.

Complement Ther Clin Pract. 2018 May;31:248-255.

[[abstract](#)]

Yoga Therapy and Polyvagal Theory: The Convergence of Traditional Wisdom and Contemporary Neuroscience for Self-Regulation and Resilience.

Sullivan MB, Erb M, Schmalzl L, Moonaz S, Noggle Taylor J, Porges SW.

Front Hum Neurosci. 2018 Feb 27;12:67.

[[full text](#)]

The Effects of Yoga on Positive Mental Health Among Healthy Adults: A Systematic Review and Meta-Analysis.

Hendriks T, de Jong J, Cramer H.

J Altern Complement Med. 2017 Jul;23(7):505-517.

[[abstract](#)]

Notable Publications *(What's this?)*

Greater Anteroposterior Default Mode Network Functional Connectivity in Long-Term Elderly Yoga Practitioners.

Santaella DF, Balardin JB, Afonso RF, Giorjani GM, Sato JR, Lacerda SS, Amaro E Jr, Lazar S, Kozasa EH.

Front Aging Neurosci. 2019 Jul 2;11:158.

[[full text](#)]

The effect of movement-focused and breath-focused yoga practice on stress parameters and sustained attention: A randomized controlled pilot study.

Schmalzl L, Powers C, Zanesco AP, Yetz N, Groessl EJ, Saron CD.

Conscious Cogn. 2018 Aug 9;65:109-125.

[[abstract](#)]

A yoga program for cognitive enhancement.

Brunner D, Abramovitch A, Etherton J.

PLoS One. 2017 Aug 4;12(8):e0182366.

[[full text](#)]