Summary and Interpretation of the Latest Published Research on Yoga and Health

Research shows that yoga interventions (particularly those that include not just postures, but also meditation, relaxation, breathing practices, and a yogic diet) can benefit a wide range of emotional and physical illnesses.

September 2006 Summaries

Feasibility and acceptability of restorative yoga for treatment of hot flushes: A pilot trial.
Source: Maturitas. Published online Sep 14 2006 ahead of print.
Authors: Cohen, B.E., Kanaya, A.M., Macer, J.L., Shen, H., Chang, A.A., & Grady, D.

Researchers at the San Francisco Veterans Affairs Medical Center and the University of California, San Francisco, conducted a pilot study of restorative yoga for the treatment of hot flushes in postmenopausal women. 14 postmenopausal women (mean age 58) experiencing moderate to severe hot flushes participated in an 8-week yoga intervention designed and taught by two certified yoga instructors with “extensive experience working with peri- and postmenopausal women.”

Participants first attended a 3-hour workshop that introduced eight postures: balasana (child’s pose), adho mukha svanasana (downward facing dog), baddha konasana (seated bound angle pose), upavisthakonasana (seated wide angle pose), viparita karani (supported legs up the wall), setu bandha sarvangasana (supported bridge pose), spata baddha konasana (supported lying down bound angle pose) and savasana (corpse pose). The women then attended eight weekly 90-min yoga classes and were asked to practice at home for 1 hour at least three times per week.

It is interesting to note that this study was reported as a feasibility and acceptability study, meaning that one of the primary goals of the study was to establish that a yoga intervention could successfully recruit and retain postmenopausal women. The researchers report 93% retention of participants, 92% of whom attended at least 7 of the 8 sessions. Participants practiced at home for an average of 170 minutes per week. At a 3-month follow-up, 75% of participants reported continuing to practice the yoga poses they had learned in the intervention; 44% went on to learn new poses. As part of the acceptability study, researchers also asked participants what was “the most bothersome part of the study.” The most common response was “taking time to practice yoga at home” (38.5%). Participants suggested that home practice guides, such as a video or handouts, would improve the intervention.
The study also reports that the participants experienced on average a 31% reduction in hot flush frequency and a 34% reduction in hot flush severity, from baseline to week 8. The authors discuss one possible mechanism for how restorative yoga can help menopausal symptoms: reduction in sympathetic activation, which can contribute to hot flushes. Although this study did not measure changes in sympathetic activation, the authors cite other studies that have demonstrated changes following yoga practice.

August 2006 Summaries

The effect of long term combined yoga practice on the basal metabolic rate of healthy adults.
Source: BMC Complementary and Alternative Medicine,6, 28.
Authors: Chaya, M.S., Kurpad, A.V., Nagendra, H.R., & Nagarathna, R.

Free full text article available at:

Researchers at a residential yoga education and research center near Bangalore City in south India investigated the effects of yoga (asana, pranayama, and meditation) on basal metabolic rate (BMR). Researchers compared two groups of residents at the center: 55 (24 women) who had been practicing yoga daily for the past six months or more, and 49 (15 women) who were working at the center and living a similar lifestyle, but not practicing yoga. The average BMR of the yoga practitioners was significantly lower than that of the non-yoga group, and this was not due to differences in body weight. There were also significant differences in respiratory variables (lower in the yoga group) but not in heart rate. What are the implications having lower BMR? Although low BMR is sometimes discussed as a health risk (i.e., for obesity), elevated BMR is also associated with greater stress. It is unclear from the health literature whether a reduced BMR is a desirable health outcome, and future research should attempt to link BMR with any health outcomes associated with yoga practice. The authors recognize these difficulties in interpreting their findings, and suggest the lower BMR seen among yoga practitioners may be a healthy adaptation associated with reduced overall arousal.

July 2006 Summaries

Oxygen Consumption and Respiration During and After two Yoga Relaxation Techniques.
Authors: Sarang, PS, and Telles, S.
This study examined the consumption of oxygen, breath rate, and breath volume in 50 male participants during two yogic practices: (1) cyclic meditation (CM), which combined yoga postures and restful awareness, and (2) relaxation in shavasana (corpse pose). The participants were assigned to one of the two conditions on alternating days, so that data was collected for both conditions for all 50 participants.

In the cyclic meditation condition, participants alternated the practice of yoga poses with supine rest. In this condition, participants were guided by audiotape and instructed to keep their eyes closed. The instructions emphasized carrying out the practice slowly, with awareness, and relaxation. The total practiced lasted 22 minutes and 30 seconds, as follows:

Phase 1 (5 min): Participants repeated a verse from the yoga text the Mandukya Upanishad (1 min), practiced isometric contraction of various muscles of the body, and then rested in a supine position (1 min 30 s). Phase 1 ended by having participants stand at ease in mountain pose (tadasana) and balancing the weight on both feet called (2 min 30 s).

Phase 2 (5 min): Participants practiced ardha-katichakrasana, a pose of bending to the right (1 min 20 s); rested for in tadasana (1 min 10 s), practiced ardha-katichakrasana to the left (1 min 20 s), and rested again a in tadasana (1 min 10 s).

Phase 3 (5 min): Participants practiced forward bending in padahastasana (1 min 20 s), followed by a rest in tadasana (1 min 10 s); backward bending in ardhacakrasana (1 min 20 s), followed by a rest in tadasana (1 min 10 s).

Phase 4 (7 min 30 s): Participants came into a supine posture for rest, and followed instructions to relax different parts of the body in sequence.

In the shavasana condition, participants lay supine in corpse posture (shavasana), eyes closed, for 22 minutes and 30 seconds.

In the cyclic meditation condition, oxygen consumption, breath rate, and breath volume increased during the yoga postures and returned to baseline levels during the rest periods. Oxygen consumption decreased by 19.3 percent below baseline values after the 22 minute and 30 second practice. The authors compare these results to the established finding that oxygen consumption increases following traditional aerobic exercise. The reduced oxygen consumption following the cyclic yoga suggests that there is no such rebound effect for moderately active yoga when the poses are practiced with rest periods. During the shavasana condition, oxygen consumption, breath rate, and breath volume decreased; however; the decrease in oxygen consumption after shavasana was only 4.8 percent. The results suggest that a combination of yoga postures with supine rest reduces
oxygen consumption more than relaxation alone does. The reductions in oxygen consumption were maintained for 30 minutes after the practice of cyclic meditation and shavasana. The authors also point out that there are no well-understood consequences for long-term reduced oxygen consumption, there are possible implications for anxiety levels (which are associated with increased oxygen consumption).

**Intraocular Pressure Changes and Ocular Biometry during Sirsasana (Headstand Posture) in Yoga Practitioners.**
Authors: Baskaran M, Raman K, Ramani KK, Roy J, Vijaya L, Badrinath SS.

The increased intraocular pressure of glaucoma reduces blood supply to the optic nerve of the eye, harming vision. This study examined the effects of sirsasana (headstand) on intraocular pressure, and risk factors for glaucoma, in 75 experienced yoga practitioners (age range of 19-86, mean age of 49 years). Pressure increased immediately upon entering headstand, and increased by 100% after 5 minutes in headstand. Pressure returned to a slightly elevated level (compared to baseline) after headstand. The study also examined the prevalence of ocular hypertension in the participants, and did not find a higher prevalence of ocular hypertensives in this group than would be expected. It’s difficult to know how to interpret the findings of this study; the increased intraocular pressure observed in headstand could, in theory, be harmful; however, there were no correlations in this sample of experienced yoga practitioners between years of headstand experience, or time spent in headstand daily, and signs of risk factors for glaucoma. The authors recommend continued research, including long-term follow-up of headstand practitioners, but no need for extreme caution among yoga practitioners.

**Effects of a yoga lifestyle intervention on performance-related characteristics of musicians: A preliminary study.**
Authors: Khalsa SB, and Cope S.

This study examined the effects of participating in an 8-week yoga and meditation program among 8 musicians (ages 21-30; 4 females) enrolled in a prestigious (and presumably stressful and challenging) 2-month summer fellowship program at Tanglewood. 8 musicians in residence at Tanglewood served as a control group.
The yoga and meditation program was held at the Kripalu Center for Yoga and Health (near Tanglewood), and consisted of the following:
a) Morning and afternoon Kripalu Yoga sessions held 7 days per week in either gentle, moderate and vigorous yoga intensity levels. Students were allowed to determine their own yoga class attendance schedule.
Participants attended, on average, 5 classes a week early in the program,
and 3 classes a week as the program progressed. 
b) Once-a-week evening sessions including a 90-minute intensive yoga 
session followed by a 2-hour discussion/problem-solving/group interaction 
session addressing practical issues in the practice of yoga and meditation 
and psychological issues relevant to musical performance and their 
progression in the musical profession (facilitated a senior Yoga and 
meditation instructor with training in counseling and psychotherapy). 
Attendance was typically 80-90%. 
c) Optional 30-minute early morning meditation sessions held 5 days per 
week. About half of participants attended these sessions. 
e) At the end of the 8-week program, the Kripalu participant fellows 
gathered for an all day retreat that included an overnight stay in the 
Kripalu dormitories, a yoga class, a group meal and other social activities. 

The researchers were interested in a variety of outcomes related to the 
challenges of performing: performance-related musculoskeletal disorders, 
performance anxiety, experience of flow states, and general mood. 
Participants in the yoga group and control completed self-report measures 
before and after the 8-week intervention. The only significant difference 
between the yoga group and the control group was lower anxiety during 
solo performances in the yoga group. However, the control group showed 
increases in negative mood states over the 8-week music fellowship, and 
the yoga group did not. Although this difference between groups was not 
significant, the small sample size did not allow researcher to detect 
potentially “real” but modest differences. The researchers point out this 
study was far more than the typical yoga asana or meditation intervention; 
the protocol is a model of a yoga lifestyle intervention. 

June 2006 Summaries 
1. Yoga for Rehabilitation in Chronic Pancreatitis 
2. Group prevention of eating disorders with fifth-grade females: impact on 
body dissatisfaction, drive for thinness, and media influence. 
3. A pilot study of a yoga meditation protocol for patients with medically 
refractory epilepsy. 
4. Comments to an Article on Health Realization/Innate Health 

Yoga for Rehabilitation in Chronic Pancreatitis 
Source: Gut, 55(7):1051. 
Authors: Sareen, S, & Kumari, V. 

This study investigated the benefits of a 12-week iyengar yoga program for 
30 individuals with chronic pancreatitis, a condition that can cause severe 
pain, particularly following meals. Prior to the yoga program, all 
participants were experiencing pain, anxiety, and weight loss associated 
with pancreatitis. They were all being treated at a clinic that offered a 
comprehensive medical approach to treating pancreatitis.
An experienced yoga teacher led three one-hour classes each week. 24 of the original 30 patients participated through the full 12-week program.

Findings: The researchers compared self-reported pain, use of pain medication, and weight at the beginning of the program and the end of the 12-week intervention. Participants reported a 62% reduction in pain and a 36% reduction in use of pain medication. Participants also gained an average of 2.2 kg (5% of the average starting weight).

Interpretation: This study offers support for the idea that yoga can improve chronic pain. A strength of this study is that it is measured not just self-reported pain, but also an important clinical outcome for chronic pancreatitis (weight gain). An important limitation of this study is its lack of a control group that would allow comparison between the yoga intervention and standard medical care or another intervention.


This study reports the results of a primary was program aimed at preventing eating disorders in young girls. The program designed for fifth-grade girls (mean age of 10 years old). Because this was a primary prevention program, the participants did not necessarily display any signs or symptoms of eating disorders, and varied greatly in weight/body mass index.

The 10-week group program took an integrated mind-body, positive psychology approach. Sessions were facilitated by a licensed psychologist, a school counselor, and two graduate students. Each session was structured as follows:
1. 30 minutes of yoga
2. 10 minutes of journal writing in response to a song or poem
3. 30 minutes of a group project/discussion
4. 15 minutes of guided relaxation and visualization.

This study examines data from three different groups (45 participants in all). A comparison of pre- and post-intervention found that the participants reported a reduced body dissatisfaction and drive for thinness following the 10-week program. The authors identified several aspects of the program that may have increased its effectiveness: the small size of each group, and the choice to focus on pre-adolescent girls, who may be more open to changing beliefs about weight, food, and body image.
The main weakness of this study is its lack of a control group; however, it provides a strong model for integrating yoga techniques into a psychological intervention.

A pilot study of a yoga meditation protocol for patients with medically refractory epilepsy.
Authors: Rajesh, B., Jayachandran, D., Mohandas, G., & Radhakrishnan, K.

Epilepsy affects about 1% of the population, and up to 50% of individuals with epilepsy continue to have seizures even while being treated with anti-seizure medications. This article reports the results of a prospective, nonrandomized trial of a yoga meditation protocol for drug-resistant epilepsy. 20 patients (14 males and 6 females, age range 15 to 47 years, median 27 years) at the R. Madhavan Nayar Center for Comprehensive Epilepsy Care were monitored for 12 weeks, then received 12 weeks of yoga meditation instruction/practice. The outcome of interest, measured at 12 weeks (before intervention), 24 weeks (after intervention) and 12 months (follow-up), was the patients’ frequency of complex partial seizures. All participants had experienced at least one complex partial seizure in the initial 12 weeks. The 12-week yoga meditation program included a weekly supervised session and 20 minutes of home practice each morning and evening. After the intervention, 19 of the 20 participants experienced a reduction in seizure frequency, and 6 experienced at least a 50% reduction in seizure frequency. After the initial intervention, participants were invited to continue practicing the yoga meditation; of the 16 participants who did, 14 experienced at least a 50% reduction in seizure frequency by a six month follow-up, and 6 experienced no seizure in the most recent 3 months.

Comments to an Article on Health Realization/Innate Health
Authors: Telles, S. & Visweswaraiah, N.K.

A surprising letter was published in Medical Science Monitor, an International Medical Journal for Experimental and Clinical Research. The letter, written by Shirley Telles and Naveen K. Visweswaraiah, from the Swami Vivekananda Yoga Research Foundation in Bangalore, summarizes the tenets of classical Yoga Philosophy, citing Pantanjali’s Yoga Sutras and the Taittreya Upanisad. The contents of letter would not be surprising to Yoga practitioners; what is surprising is that a mainstream medical journal considered this letter worthy and important for its audience of medical professionals and scientists. The letter was in response to an article that asked the question: “Can a quiet mind and a positive feeling state be accessible over the lifespan without stress-relief techniques?” Telles and Visweswaraiah describe Yoga philosophy as a way of answering “Yes,”
arguing that the result of Yoga practice is “a completely ‘free’ mind, free from all (‘good’ and ‘bad’) patterns of responding. This steady mental state, which is equally undisturbed by ‘good’ and by ‘bad’ events, is considered as a state of ‘perfect bliss’ (ananda), which is the inherent state of every person.”

May 2006 Summaries
1. The Phenomenology of Meditation for Female Survivors of Intimate Partner Violence
2. Some Light on the Popularity of Yoga and Famous Yoga Masters
3. On the Stability and Modifiability of the Sense of Coherence in Active Seniors
4. Mindfulness Meditation for Oncology Patients: A Discussion and Critical Review

The Phenomenology of Meditation for Female Survivors of Intimate Partner Violence.
Author: Kane, K.E.

This phenomenological study (using semi-structured interviews) explored the use of meditation as a strategy for healing the physical, emotional, cognitive, and spiritual impact of intimate partner violence.

The six women in this study (all Caucasian, ranging in age from 31 to 49) participated in a 90-minute group session that taught a form of concentrative meditation focusing on the breath. The women were instructed “to gently return awareness to the breath as they noticed their attention being drawn to external and internal distractions.” This instructional session was followed by six weeks of a once-a-week group meditation, which included two meditation periods separated by a discussion period. The author described this weekly session as: “designed to provide the opportunity for [the women] to develop a sense of connection with others, to serve as a check-in to address any specific questions related to the techniques of meditation, and to provide encouragement for the women to maintain a regular practice.” The women were also encouraged to practice the meditation on their own for 20 minutes a day.

The author observed 9 main themes in the interviews with participants:
1) The women were motivated by a desire for change and viewed meditation as a vehicle for change.
2) The women experienced challenges learning to meditate, and many experienced frustration.
3) The women experienced changes in practice over time that can best be described as a lessening of the struggle to control the process of
4) Many of the women had sensory experiences related to heaviness or weightlessness, and one experienced an increased awareness of the pain related to previous injuries/violence. 
5) The majority of women preferred meditating at home over the group sessions, and many experienced self-consciousness during the group practice. 
6) The women experienced greater well-being (peace, relaxation, focus) following meditation. 
7) The women noticed sustained changes in mindfulness and staying “centered” in everyday life. 
8) The women experienced a greater connection with the self or spiritual connection. 
9) The women learned to deal with abuse-related memories and thoughts during meditation, but it presented a significant challenge to their continued participation. 

It is useful to note that the women were recruited for this study from a support agency, and meditation sessions were held at the agency. This kind of integration with an established community and support group is an important aspect of research and service. 

Some Light on the Popularity of Yoga and Famous Yoga Masters
Author: Smith, J.C.
Source: PsycCRITIQUES, Vol 51 (2). Published online.
http://www.apa.org/psyccritiques/

Although not a research article, it is interesting to note that PsycCRITIQUES, published by the American Psychological Association, reviewed BKS Iyengar’s latest book, Light on Life: The Yoga Journey to Wholeness, Inner Peace, and Ultimate Freedom. The following quote sheds light on how the largest professional association for mental healthcare providers in the U.S. may view yoga: “Many people find yoga useful as a set of exercises. However, psychological and medical advice offered by teachers outside of the health professions can be misleading.” The review also makes a point that most yoga therapists would agree with: “Different approaches to relaxation, meditation, and mindfulness may well have different effects. It is misguided to assume that one family of approaches is consistently superior.” 

On the Stability and Modifiability of the Sense of Coherence in Active Seniors
Authors: Wiesmann, U., Rolker, S., Ilg, H., Hirtz, P., & Hannich, H.J.

[Note: This article is published in German and this summary is based
Sense of coherence (SOC), as defined by Antonovsky, is a global psychological orientation to life. High SOC is associated with three beliefs: (1) your experiences and environment are structured, predictable, and explainable; (2) you have access to the resources needed to meet life’s challenges; and (3) life’s challenges are worthy of investment and engagement. This study examined whether several types of interventions influenced SOC among a senior population. 42 active seniors (mean age of 66.3 years, 65.5% female), participated in a 14-week program focusing on physical activity and/or self-reflection (endurance training, strength training, yoga, or meditation). The participants’ SOC was significantly strengthened over time, for all types of intervention. Participants also showed an improvement in well-being, subjective health, and psychosocial resources. Although this study does not report on no-intervention comparison group/control group, it is worth noting that SOC is generally believed to be stable, and improvements in SOC represent general improvements in the ability to cope with life stressors.

Mindfulness Meditation for Oncology Patients: A Discussion and Critical Review
Authors: Ott, M.J., Norris, R.L., & Bauer-Wu, S.M.

This article reviews the existing and emerging research on mindfulness meditation as an intervention for cancer patients. The authors describe the rationale for teaching mindfulness meditation to cancer patients as follows: “Mindfulness meditation can be helpful to cancer patients across the continuum of care from diagnosis through procedures, treatments, cure, and survival, as well as at the end of life. It is a useful skill that can be practiced by patients to reduce and cope with stress, promote relaxation, and alleviate physical discomfort and emotional distress.” Mindfulness practices commonly taught include sitting meditation, awareness of sensations, the body scan (a breath visualization practice), and mindful movement (typically gentle yoga or walking meditation).

The authors’ search for studies published between 1987 and 2004 identified 9 research articles and 5 conference abstracts. [Note: A search on PubMed in May 2006 identified only one additional study of mindfulness for cancer patients; it demonstrated benefits for sleep quality, energy levels, and mood.]

The majority of studies focused on group mindfulness classes for breast and prostate cancer patients. The studies consistently reported positive
effects on psychological well-being, as well as reductions in physical symptoms. The authors also found limited/mixed evidence for the benefits of mindfulness interventions on nutritional outcomes - namely, adopting a lower-fat and lower-calorie, plant-based diet, and reducing caffeine intake. Evidence for immunological and neuroendocrine effects were much more limited, mostly due to a lack of published research. The few published studies provide promising evidence that mindfulness may have an anti-inflammatory effect, and may influence the physiological stress response, but there is not enough evidence to make strong claims.

**April 2006 Summaries**

**Effect of Sahaj Yoga on depressive disorders.**
Authors: Sharma, V.K., Das, S., Mondal, S., Goswampi, U., & Gandhi, A.

This study compared the effects of anti-depressant medication with a combined approach of anti-depressant medication and Sahaj Yoga (for more information about this meditation approach, visit http://www.sahajayoga.org). 30 adults (19 men) were randomly assigned to either medication alone or medication and 8 weeks of Sahaj Yoga training. At the end of the 8 weeks, both groups showed improvements in depression symptoms, but participants in the combined medication and yoga group showed greater improvement. Also, a higher percentage of participants in the combined group were in full remission from depression at the end of the 8 weeks.

**An exploratory mixed methods study of the acceptability and effectiveness of mindfulness-based cognitive therapy for patients with active depression and anxiety in primary care.**

Authors: Finucaine, A., & Mercer, S.W.

The full article is available for free to the public: http://www.biomedcentral.com/content/pdf/1471-244x-6-14.pdf

This study evaluated how an 8-week Mindfulness Based Cognitive Therapy (MBCT) course could be in a primary-care setting for individuals with
recurrent depression and anxiety. The authors report on the experience of 13 patients (taken from qualitative interviews with the patients). The researcher also measured participants’ depression and anxiety (through self-report questionnaires) before and after the MBCT course, and found statistically significant reductions in depression and anxiety following the course. Of particular note are two findings from the interviews: most participants thought the 8-week course was too short, and more than half continued to practice mindfulness techniques learned in the course. The interviews also highlight the value of group support for learning the techniques, and also the frustration and challenge associated with making time for the practice and learning the practices. This article differs from most published research on mindfulness - and will be especially interesting to teachers - for the extensive quotes from interviews with participants.

The meeting of meditative disciplines and Western psychology: a mutually enriching dialogue.

Authors: Walsh, R., & Shapiro, S.L.

Early in this paper, the authors share a quote from the 1966 book The History of Psychiatry, which described “the obvious similarities between schizophrenic regressions and the practices of Yoga and Zen”. Much has changed since then, with substantial interest among the psychology community in meditation techniques. The authors call the current period of enthusiasm about meditation one of “assimilative integration.” Some yoga traditionalists may bristle at that term, and the authors certainly do not see this stage as maximally useful or honoring towards either Western psychology or meditation tradition. The authors argue for maintaining the value and integrity of both Eastern and Western traditions by moving towards “mutual enrichment”, “systematic integration”, and finally the “integral stage” that results in “comprehensive, coherent, and holistic conceptual framework, adequate to both meditative and psychological traditions.” The authors go on to define several techniques and concepts of meditation, and review Western research on meditation. In discussing how meditation “works”, or produces psychological benefits, the authors point out that both meditation and psychotherapy share the process of “refining
awareness,” and this may precede the process of “disidentification” that is important in the tradition of meditation. Anyone currently conducting research on meditation or using meditation in psychotherapy should obtain this article.

**Meditation states and traits: EEG, ERP, and neuroimaging studies.**
Authors: Cahn, B.R., & Polich, J.
Source: Psychological Bulletin, 132(2):180-211

This review of research on the neuroscience of meditation is notable first for its publication in arguably the most prestigious scholarly psychology journal. Although this review is too comprehensive to summarize, a few points of the review are worth noting:
1) The authors characterize different forms of meditation by how they influence attention, with a distinction between mindfulness and concentration.
2) The authors identify two kinds of effects from meditation: state (what happens when someone is meditating) and trait (long-term changes based on the practice of meditation but not limited to the state of meditation).
3) A review of EEG studies demonstrates that meditation does influence brain activity (alpha and theta waves), but because of the variety of meditation techniques used and research methods, the authors did not draw any conclusions about specific brain activity changes.
4) A review of brain imaging studies suggests that different techniques have different effects on brain activation, and these effects correspond to what you might predict (for example, visualization meditations activating the visual areas of the brain, and a meditation on joy activating the area of the brain associated with processing positive emotion).

**March 2006 Summaries**

**Yoga and pranayama help overweight teens lose weight.**


Researchers from Hampton University in Virginia presented findings on the
benefits of yoga and pranayama for teenagers at the March 2006 American Heart Association’s annual conference on Cardiovascular Disease Epidemiology and Prevention. Their study compared weight loss/gain in two groups of overweight high school students: 30 students who were taught 40 minutes of yoga and pranayama four times a week for 12 weeks, and 30 students who received no instruction. Neither group was instructed to diet or change food intake. Students in the yoga group showed a 5.7 percent decrease in average body mass index (BMI) and weight loss of six pounds, whereas students in the control showed a non-significant increase in average BMI.

Stress management: a randomized study of cognitive behavioral therapy and yoga.


This study compared the psychological and physiological benefits of a Kundalini yoga program and a stress management program based on cognitive behavioral therapy principles. 33 employees (26 women) at a large Swedish company were randomly assigned to one of the two programs. Each program included 10 sessions over 4 months. Participants in both groups showed significant improvements in both psychological (self-rated stress and stress behavior, anger, exhaustion, quality of life) and physiological (blood pressure, heart rate, urinary catecholamines, salivary cortisol) outcomes. There was no significant difference between groups. The authors conclude that both “cognitive behavior therapy and yoga are promising stress management techniques.”

The effectiveness of body-oriented methods of therapy in the treatment of attention-deficit hyperactivity disorder (ADHD): results of a controlled pilot study

[This article is published in German, and the following summary is based only on the English translation of the article’s abstract.]


This randomized controlled pilot study compared the effectiveness of yoga and conventional motor exercises for children with attention-deficit hyperactivity disorder (ADHD). Nineteen children with a clinical diagnosis of ADHD were randomly assigned to either yoga or conventional exercise. Children in the yoga group showed greater improvements in attention and reduced symptoms of ADHD, as reported by their parents. However,
children in both groups improved over time, and at the end of the study, the group means for the ADHD scales did not differ significantly from those for a representative control group. The training was particularly effective for children who were also undergoing pharmacotherapy. The authors conclude that yoga can be an effective complementary or concomitant treatment for ADHD.

**Using self-report assessment methods to explore facets of mindfulness.**

Authors: Baer, R.A., Smith, G.T., Hopkins, J., Krietemeyer, J., & Toney, L. 

This paper is particularly important for researchers who use mindfulness as a predictor or outcome, and need a reliable and valid questionnaire to measure mindfulness. It may also be useful for clinicians who are interested in how mindfulness changes over time.

The authors review the available mindfulness questionnaires report the results of a factor analysis that revealed five facets of mindfulness. Analyses showed that these facets may be differentially related to other psychological factors; the “non-judging of experience” facet was most strongly associated with psychological well-being.

Below are the five factors identified, with an example of an item that represents each factor.

**Factor 1: Non-reactivity to Inner Experience**
Example: I perceive my feelings and emotions without having to react to them.

**Factor 2: Observing/noticing/attending to sensations/perceptions/thoughts/feelings**
Example: I remain present with sensations and feelings even when they are unpleasant or painful.

**Factor 3: Acting with awareness/automatic pilot/concentration/non-distraction**
Example: I break or spill things because of carelessness, not paying attention, or thinking of something else. (reverse-scored)

**Factor 4: Describing/labeling with words**
Example: I can easily put my beliefs, opinions, and expectations into words.

**Factor 5: Nonjudging of experience**
Example: I tell myself I shouldn’t be thinking the way I’m thinking.

Researchers or clinicians interested in obtaining the full set of items and scoring instructions should contact the author or purchase the article from the publisher online. [http://asm.sagepub.com/cgi/reprint/13/1/27](http://asm.sagepub.com/cgi/reprint/13/1/27)

**The beneficial effect of yoga in diabetes.**
Authors: Malhotra, V., Singh, S., Tandon, O.P., & Sharma, S.B.
This study investigated the benefits of yoga asana for twenty participants (between the ages of 30 and 60) with mild to moderate non-insulin dependent diabetes. All participants were on diet and medication for the control of diabetes. The study also compared the yoga group to a control group of 36 adults, also following a diet and medication plan to control diabetes, that practiced standard exercise guidelines for diabetes (such as walking).

Participants in the yoga group practiced yoga for 30-40 minutes every morning for 40 days. The asana practice included: surya namaskar, bhastrika pranayama, trikonasana, tadasana, sukasana, padmasana, pashimottanasana, ardhamatsyendrasana, pawanmuktasana, bhujangasana, vajrasana, dhanurasana, and savasana.

Yoga participants showed the following changes after the 40-day program: reduced waist to hip ratio (high waist to hip ratio is considered a risk factor for cardiovascular and metabolic disease) and a decrease in fasting blood glucose. There was also a marginally significant trend for reductions in postprandial (after-meal) blood glucose levels. Among obese participants (but not participants of lower weight), serum levels of insulin decreased. All of these changes are considered positive for the management of diabetes. The control group showed no positive changes in any of these measurements.

The authors conclude that, “yoga asanas may be used as an adjunct with diet and drugs in the management of Type 2 diabetes.”

February 2006 Summaries

Physiological Responses to Iyengar Yoga Performed by Trained Practitioners.
Author: Blank, S.E.
Source: Journal of Exercise Physiology Online, 9, 7-23.
Access the full article for free at: http://www.unm.edu/~rrobergs/JEPonline/Feb06/Feb06.htm

This study measured the physiological responses of 15 female intermediate/advanced level Iyengar yoga practitioners (mean age 43.5 ±
6.9 yr), during an active iyengar asana practice. In particular, the report focuses on cardiovascular and respiratory responses. During the 90 minute practice, practitioners expended an average of 149.4 ± 50.7 Kcal, which is equivalent to very mild exercise (walking might expend 300 Kcal, in comparison), and the practice did not meet the standards for sustained cardiovascular exercise. Backbends had the greatest cardiovascular response, compared to standing poses, inversions, and seated or supine poses. Interestingly, misalignment in poses influenced blood pressure responses in the pose. For example, misalignment in the warrior poses was associated with greater systolic blood pressure in the poses. Anyone interested in this data should access the full article online, as it includes a detailed list of asanas (including photos) and full statistics for every pose.

**Impact Of Pranayama And Yoga On Lipid Profile In Normal Healthy Volunteers.**

**Authors:** Prasad, K.V.V., Sunita, M., Raju, P.S., Reddy, M.V., Sahay, B.K., & Murthy, K.J.Y.

**Source:** Journal of Exercise Physiology Online, 9, 1-6.

Access the full article for free at: [http://www.unm.edu/~rrobergs/JEPonline/Feb06/Feb06.htm](http://www.unm.edu/~rrobergs/JEPonline/Feb06/Feb06.htm)

**Participants:** 41 men and 23 women (ages 18-30 years) participating in a three months yoga certificate course at the Vemana Yoga Research Institute in Hyderabad, India. All volunteers were healthy, with no previous yoga experience.

**Yoga Instruction:** For 30 days, the following pranayama sequence was practiced: Rechaka Puraka, Rechaka Puraka with Kumbhaka, Suryabedha Chandrabedha, Suryabedha Chandrabedha with Kumbhaka, and Kapalabhati, for 10 min each. Savasana was practiced for another 10 min at the end of the pranayama session. After 30 days, the pranayama practice was reduced to 20 min, and the following asanas were practiced for 40 min: Uttanasana, Mandukasana, Ustrasana, Yogamudra, Matsyendrasana, Paschimottanasana, Bhujangasana, Sarvangasana, Halasana, Uddiyana, Ardhamatsyendrasna, Dhanurasana, Shalabhasana, Sarpasana and
Chakrasana. This combined pranayama and asana practice was continued for 60 days.

Results: Women and men showed different metabolic responses to the pranayama and asana practices. However, in general, the responses of both women and men were positive (improvements/reductions in risk factors for metabolic and cardiovascular diseases). Men showed reduced levels of serum triglycerides and VLDL-cholesterol at the end of the first 30 days (pranayama practice only), and increased levels of HDL-cholesterol (the "good" cholesterol) and free fatty acids at the end of both the first 30 days (pranayama practice only) and at the end of the 3-month session. There was no change in LDL-cholesterol. Women showed reduced levels of serum free fatty acids at the end of both the first 30 days (pranayama only) and the 3-month session, and also showed reduced levels of total cholesterol, triglycerides, LDL-cholesterol and VLDL-cholesterol by the end of the 3-month session. There were no changes in HDL-cholesterol.

Randomized, Controlled, Six-month Trial of Yoga in Healthy Seniors: Effects on Cognition and Quality of Life.
Authors: Moolasarn, S., Sri, S., Kuessirikiet, V., Sutawee, K., Huasary, J., Chaisila, C., Chechom, N., & Sankan, S.
Source: Alternative Therapies in Health and Medicine, 12, 40-7.
This randomized, controlled trial compared the benefits of six months of yoga, walking, and a wait-list control for 118 generally healthy seniors (65-85 years). The yoga and walking conditions included both group classes and a recommendation of home practice. Neither yoga nor walking improved cognitive function (including an EEG measure of alertness). Participants in the yoga condition showed improvements in physical outcomes such as balance and flexibility, and quality of life outcomes such as energy and sense of well-being.

Evaluating a Yogic Breathing and Meditation Intervention for Individuals Living with HIV/AIDS.
Authors: Brazier, A., Mulkins, A., & Verhoef, M.
Source: American Journal of Health Promotion, 20, 192-5.
This randomized controlled trial examined the benefits of a residential program, based on the Art of Living Course, for individuals living with HIV/AIDS. The program teaches breathing, movement, and meditation
techniques. 47 out of 62 volunteers from community HIV/AIDS organizations completed study. Participants who completed the Art of Living program showed improvements in mental and physical well-being immediately following the program, but these improvements were not maintained at later follow-up points. Quantitative measures showed increases in daily stress following the program, but qualitative interviews suggested that participants had made positive changes in everyday life. This highlights the one of the challenges of studying the benefits of an intervention: how well do quantitative surveys capture the benefits of yoga and meditation?

January 2006 Summaries

Authors: Sherman, K.J., Cherkin, D.C., Erro, J., Miglioretti, D.L., & Deyo, R.A.

This randomized controlled trial compared the benefits of yoga, conventional therapeutic exercise, and a self-care book for chronic low back pain.

Participants: 101 adults (66% women, mean age of 44) with chronic low back pain, the majority of whom had experienced pain for longer than one year, and had experienced pain for more than 45 of the past 90 days prior to entering the study.

Interventions: Participants were randomly assigned to either a 12-week yoga intervention, a 12-week exercise intervention, or a home study/educational book intervention. IAYT Advisors Gary Kraftsow and Robin Rothenberg designed the 75-minute group classes and home practice guides for participants. The classes followed a gentle viniyoga approach specifically designed for back pain. Each class had a specific focus (such as relaxation, strengthening the hip muscles, or customizing a personal practice), and included a question-and-answer period, an opening and closing breathing exercise, 5 to 12 postures, and a guided deep relaxation.
Postures were repeated rather than held, and included: cobra, bridge, knees to chest, reclining leg stretches and hip openers, modifications of warrior and chair, standing forward bend, and kneeling forward bend (child’s pose). The therapeutic exercise intervention was designed by a physical therapist, and included education about biomechanics and both aerobic and strength-building exercise. The self-care book was *The Back Pain Helpbook* by J. Moore et al., an evidence-based book that teaches a comprehensive fitness and strength program, lifestyle changes, and guidelines for managing pain.

Results: Participants in the yoga group showed the greatest improvements in back function at 12 weeks (the end of the intervention). At 26 weeks, the yoga group also showed greater improvements in symptoms/less use of pain medication than the other two groups. At 26 weeks, the yoga group and therapeutic exercise group showed similar improvements in back function, and both groups showed greater improvements than the education book group.

An educational handout summarizing this study was written for the public and is available at:

http://www.annals.org/cgi/summary_pdf/143/12/849.pdf

Note: An interview with author Karen Sherman and yoga teacher Robin Rothenberg, discussing the yoga program used in this study and the challenges of running the study, was published in the 2005 *International Journal of Yoga Therapy*.

A pilot study of yoga for breast cancer survivors: physical and psychological benefits.


Authors: Culos-Reed, S.N., Carlson L.E., Daroux L.M., & Hately-Aldous, S.

This pilot study examined the physical and psychological benefits of a 7-week yoga program for cancer survivors. Study volunteers were randomly assigned to either the yoga intervention (n=20) or to a wait-list control group with no intervention (n=18). Participants completed pre- and post-intervention assessments, including both self-report of psychosocial and physical well-being, and physiological measurements (i.e. of weight, blood pressure, and grip strength).
Participants: Participants had a mean age of 50, and were on average more than 4 1/2 years past initial cancer diagnosis. 95% of participants were female, and 85% were survivors of breast cancer.

Intervention: The yoga classes began with 10 minutes of gentle breathing, laying supine, with legs flexed at the hip and supported by a wall, followed by 50 minutes of 6-10 modified gentle asanas (which varied over the course of 7 weeks as participants’ flexibility and strength improved) and 15 minutes in savasana (relaxation). The classes are described as Iyengar-influenced, with special attention to kinesiology and an emphasis on "moving mindfully and in [a] pain-free range of motion". Yoga group participants were divided into two waves, so that only 10 participants were in each class.

Results: Following the intervention, significant improvements were seen in both psychosocial well-being (i.e., mood, quality of life, and stress) and in physical fitness (i.e., healthy weight gain and flexibility). However, significant differences between the yoga group and control group were seen only in psychosocial well-being. Participants in the yoga group showed greater improvements in psychosocial well-being, compared to members of the control group. Both groups showed similar improvements in physical fitness. The authors point out that many participants in the control group reported beginning their own physical fitness activities when they were not assigned to the yoga intervention. Therefore, it is difficult to interpret the lack of difference in improved fitness between yoga and control groups.

These authors conclude that the findings of this pilot study "suggest that yoga has significant potential and should be further explored as a beneficial physical activity option for cancer survivors."

Integrative review of research related to meditation, spirituality, and the elderly.
Author: Lindberg, D.A.
This article reviews the last 25 years of research on the benefits of meditation for the elderly. The authors defined meditation broadly, to
include formal mindfulness meditation, other mindfulness practices, guided imagery, and meditative prayer. The review summarizes a wide range of benefits supported by studies, including: reduced anxiety, increased self-esteem, increased restfulness and alertness, decreased impatience, decreased agitated behavior, increased group participation, improved self-control, and increased relaxation. These benefits were seen in participants with a wide range of problems associated with aging, including physical disease and cognitive problems such as memory loss and dementia. According to the authors, "This review supports the hypothesis that meditation can be taught to the elderly, even those with dementia. The results also support the hypothesis that meditation and spiritual practices could promote significant social and emotional benefits for those in social isolation." The authors also point out the general importance of a spiritual framework for aging, to support and honor the elderly.

ARCHIVES

Risk indices associated with the insulin resistance syndrome, cardiovascular disease, and possible protection with yoga: a systematic review.
Authors: Innes, K.E., Bourguignon, C., & Taylor, A.G.

This article reviews research (published between 1970 and 2004) on the effects of yoga on insulin resistance and cardiovascular disease. 70 studies were identified, including 1 observational study, 26 uncontrolled clinical trials, 21 nonrandomized controlled clinical trials, and 22 randomized controlled clinical trials.

These studies provide evidence that yoga can improve many physiological indicators of insulin resistance and cardiovascular disease, including glucose tolerance and insulin sensitivity, lipid profiles, anthropometric characteristics, blood pressure, oxidative stress, coagulation profiles, sympathetic activation, and cardiovagal function. Yoga is also associated with improvement in several clinical outcomes, such as need for drug
Yoga for anxiety: a systematic review of the research evidence.
Authors: Kirkwood, G., Rampes, H., Tuffrey, V., Richardson, J., Pilkington, K., & Ramaratnam, S.

The article reviews controlled clinical trials on the effectiveness of yoga for the treatment of anxiety and anxiety disorders. The review covered major databases, as well as organizations such as the International Association of Yoga Therapists and the Yoga Biomedical Trust. Only eight controlled clinical trials were identified. The tradition/approach to yoga varied among studies, and studies focusing on meditation only were excluded. Most yoga interventions included asana, breathing, and relaxation. One studied compared Kundalini yoga to mindfulness meditation and relaxation, and found that yoga was more effective in reducing anxiety than mindfulness meditation and relaxation. Several studies compared yoga to anti-anxiety medications, and reported greater improvements from yoga than medication. Despite the positive findings, the authors conclude that the quality of research is not adequate to make strong claims about the benefits of yoga for anxiety. The authors recommend continued research.

The full review, including an excellent table summarizing the eight clinical trials, is available for free at: 
http://bjsm.bmjjourrnals.com/cgi/content/full/39/12/884

Yoga reduces stress and anxiety among distressed women.

Researchers from the Department of Integrative and Internal Medicine at
the University Duisburg-Essen, Germany, investigated the benefits of an Iyengar yoga practice on stress, anxiety, depression, and physical well-being. Outcome measures were self-reported symptoms.

The study design was a controlled prospective non-randomized trial. The participants were 24 self-referred women (mean age 37.9, +/- 7.3 years) who identified themselves as having high levels of stress, but did not have a psychiatric diagnosis (i.e., clinical depression or anxiety disorder). 16 women participated in the intervention first, while the 8 remaining women served as a wait-list control (and received the intervention later).

The yoga intervention consisted of two weekly 90-min Iyengar yoga classes with a certified and experienced Iyengar instructor. The classes focused on poses that are hypothesized, in the Iyengar tradition, to reduce stress. These include backbends, standing poses, forward bends, and inversions. The study did not provide more details on the specific asanas or sequences practiced. Participants were also encouraged to practice at home.

Compared to the wait-list control group, the yoga group showed significant reductions in stress, anxiety, fatigue, depression, headaches, and back pain. The yoga group showed significant increases in well-being.

Meditation experience is associated with increased cortical thickness. Source: Neuroreport, 16, 1893-1897. November 2005

Authors: Lazar, S.W., Kerr, C.E., Wasserman, R.H., Gray, J.R., Greve, D.N., Treadway, M.T., McGarvey, M., Quinn, B.T., Dusek, J.A., Benson, H., Rauch, S.L., Moore, C.I., & Fischl, B.

This study compared the brain structure of 20 long-term meditators and 15 non-meditators. Magnetic resonance imaging was used to assess cortical thickness. The meditators had, on average, 9 years of meditation experience and practiced daily. 5 of these participants were meditation or yoga teachers. The study matched meditators and controls by important variables, such as age, gender, and education, that could influence brain structure.

Brain regions associated with attention, interoception, and sensory processing (including the prefrontal cortex and right anterior insula) were thicker in meditators than in controls. The authors hypothesize that Insight meditation influences these regions of the brain through its focus on sensation and awareness. Differences in prefrontal cortical thickness were strongest in comparisons of older participants. The authors interpreted this as suggesting that meditation can prevent age-related cortical loss. Interestingly, the thickness of two regions - the inferior occipitotemporal visual cortex and right anterior insula - correlated with meditation.
experience, as measured by both total hours of formal sitting practice and the meditator’s ability to lower breathing rate in meditation.

A randomized controlled trial of meditation and massage effects on quality of life in people with late-stage disease: a pilot study.

Researchers at the Yale Prevention Research Center conducted a randomized, controlled pilot study of Metta meditation, with and without massage, to investigate the independent and synergistic effects on quality of life among patients with AIDS. The two-year study was conducted at a 40-bed nonprofit, skilled nursing facility dedicated to HIV/AIDS care. The authors note that these two interventions - which both foster a sense of connection to others - may be particularly helpful for individuals with AIDS, a disease that is often accompanied by social stigma and isolation. In particular, the authors hypothesized that physical, healing touch can make individuals more receptive to the practice and benefits of meditation.

Over the course of the study, 58 residents (43% women) nearing end-of-life were randomly assigned to either: a) 1 month of meditation, which included a 90-minute introductory instruction, and daily practice to a 15-minute meditation audiocassette, b) 1 month of Swedish massage therapy, 30 minutes per day, 5 days per week, c) 1 month of both meditation and massage, or d) standard care (no intervention).

The following Metta (lovingkindness and forgiveness) meditation was used:

Phrases offering loving-kindness to self:
May I be free from danger
May I be well
May I be happy
May I be peaceful

Phrases offering loving-kindness to others:
Just as I wish to be free from danger, may you be free from danger
Just as I wish to be well, may you be well
Just as I wish to be happy, may you be happy
Just as I wish to be peaceful, may you be peaceful

Phrases offering forgiveness to self:
For all of the ways I have hurt or harmed myself, knowingly or unknowingly, I offer forgiveness.

Phrases offering forgiveness to others:
I forgive you for whatever you have done, intentionally or unintentionally—through your actions, words, even through your thoughts. Through what you did, and what you failed to do. However the pain came to me through
you, I forgive you.

Phrases asking forgiveness of others:
I ask that you forgive me for whatever I may have done, intentionally or unintentionally, through my words, my actions, or even through my thoughts. However I may have hurt or injured you—I ask your forgiveness.

Importantly, the study provided ongoing access to the meditation instructor, so that participants could ask questions about the meditation process, or discuss their experiences.

The study measured five dimensions of well-being at three time points: 1) before the intervention, 2) 8 weeks (one month following the intervention), and 3) 68 weeks (long-term follow-up for those participants still living). 41 residents completed full study; the other 17 participants experienced a decline in mental status, left the facility for more intensive care or to prepare for death, or died while in care at the center.

Results: Only the combined intervention group (meditation plus massage) showed significant improvements in well-being at the 8-week follow-up. In particular, the combined intervention group showed improvement in function, interpersonal well-being, and spiritual well-being. These benefits seemed to persist at the longest follow-up (68 weeks). Both the meditation-only and massage-only groups maintained or improved function, while the standard-care control group showed a decline.

These results suggest that meditation and touch therapy complement each other in end-of-life and advanced-illness care. This is an important idea for both individual yoga therapists, who may be able to supplement instruction with manual/touch therapies or collaborate with other therapists, and for program development at hospitals, hospice centers, and other healing centers.


Efficacy of frequent mantram repetition on stress, quality of life, and spiritual well-being in veterans: a pilot study.

Researchers at San Diego State University's Veterans' Healthcare System examined the benefits of a mantram meditation on perceived stress, anxiety, anger, symptoms of posttraumatic stress disorder (PTSD), quality of life, and spiritual well-being.
A central goal of this study was to consider an intervention that specifically addresses spirituality and spiritual coping. The authors note that many stress-reduction interventions offer strategies for relaxation, emotional coping, and cognitive change, but fail to address spiritual concerns.

62 outpatient veterans (90% men, with a mean age of 62) participated in the full study, which consisted of a 5-week, 90-min per week intervention, with pre-intervention and post-intervention self-report measures of stress, anxiety, anger, quality of life, and spiritual well-being.

The intervention included 5 classes: 1) How to Choose a Mantram, 2) How to Use and Track Mantram Practice, 3) Developing One-Pointed Attention, 4) Slowing Down, and 5) Putting It All Together. Participants choose a mantram from a recommended list that included several major spiritual traditions. Below are a few examples from that list:

- Buddhist: Om Mani Padme Hum (Ohm Mah-nee Pod-may Hume), an invocation to the jewel (Self) in the lotus of the heart
- Christian: Kyrie Eleison (Kir-ee-ay Ee-lay-ee-sone), Lord have mercy, or the Lord is risen.
- Hindu: Rama (Rah-mah), eternal joy within.
- Jewish: Shalom, Peace
- Muslim: Bismallah Ir-rahman Ir-rahim (Beesemah-lah ir-rah-mun ir-rah-heem), in the name of Allah, the merciful, the compassionate
- Native American: O Wakan Tanka Oh, Great Spirit

Participants were taught how to use their mantram in everyday life and activities, rather than as practice limited to seated meditation. Participants reported an average of 8.7 (SD=7.32) daily mantram sessions.

Results: Participants reported significant improvements in all outcomes: stress, anxiety, anger, quality of life, and spiritual well-being. The largest improvements were in anxiety and spiritual well-being. Additional analyses suggest that greater frequency of mantram practice is associated with greater improvements. The authors recommend continued study and application of mantram in health care settings.

Authors: Bormann, J.E., Smith, T.L., Becker, S., Gershwin, M., Pada, L., Grudzinski, A.H., & Nurmi, E.A.

Yoga for depression: The research evidence.

This article reviews both published and ongoing research on Yoga-based interventions for the treatment of depression, up to June 2004. Interestingly, the authors excluded studies that involved interventions
based solely on meditation and those involving complex or multiple interventions (i.e. the well-known mindfulness-based stress reduction program). 5 randomized controlled trials were identified. Most interventions focused on younger adults (mean ages 18-35), and clinical status varied from mild depression to severe depression. All five trials reported positive outcomes, and only one reported any adverse outcomes (fatigue and breathlessness). Breathing practices were an important part of the interventions, and three of the five interventions included only breathing and relaxation practices (no asana). Both asana practices included backbending, which traditionally has been thought to relieve depression. The authors of the review did not discuss in detail the benefits of various asanas. The authors caution that variations among the study designs, yoga interventions, and study participants make it difficult to draw strong general conclusions. However, the overall positive results suggest that yoga has potential as a therapeutic intervention for yoga.

Authors: Pilkington, K., Kirkwood, G., Rampes, H., & Richardson, J. Research Council for Complementary Medicine, London, UK
Source: Journal of Affective Disorders. Published online (ahead of print) Sep. 23 2005.

Effect of a gentle iyengar yoga program on gait in the elderly: an exploratory study.

Researchers at the University of Virginia's Department of Physical Medicine and Rehabilitation tested the effects of a specially-designed yoga program on age-related changes in gait (walking) in a healthy senior population. 19 healthy adults (62-83 years old), all new to yoga, were participated in an 8-week iyengar yoga program (two 90-minute yoga classes per week) specifically tailored to seniors, and designed to improve lower-body strength and flexibility. Participants were also asked to complete at least 20 minutes of home practice on alternate days.

Each group session included yoga postures and breathing exercises adapted for beginners and seniors. Yoga postures included: surya namaskar (modified sun salutations using a chair and props), virasana (hero pose), vajrasana (thunderbolt pose), tadasana (mountain pose), table pose (including leg-lifts), parsvotanasana (flank stretch), virabhadrasana (warrior pose), salabasana (locust pose), padangusthasana (holding the big toe pose), supta padangusthana (holding the big toe lying down pose), uttitha hasta padangustasana (extended holding the big toe pose), supta baddha konasana (lying down bound angle pose), eka pada bhekasana (one-leg frog pose), raja kapotasana (pigeon or hip stretch pose), and shavasana (corpse pose). Consistent with an iyengar asana practice, props (blankets, chairs, blocks) were used in many postures.
Researchers examined pre- and post-intervention changes in peak hip extension, average anterior pelvic tilt, and stride length at comfortable walking speed. Peak hip extension and stride length significantly increased, and there was a marginally-significant trend toward reduced average pelvic tilt. Participants who completed the home yoga practices were more likely to show this improvement. Both the frequency and duration of yoga home practice predicted changes in hip extension and average pelvic tilt, suggesting that home practice is an important part of yoga interventions.

Authors: DiBenedetto, M., Innes, K.E., Taylor, A.G., Rodeheaver, P.F., Boxer, J.A., Wright, H.J., & Kerrigan, D.C.
Source: Archives of Physical Medicine and Rehabilitation, 86, 1830-1837.

Intracerebral pain processing in a Yoga Master who claims not to feel pain during meditation.

This is a truly fascinating case study from the Department of Integrative Physiology at the National Institute for Physiological Sciences in Japan. Researchers studied the brain activity of a Yoga master who reports not feeling pain during meditation. Using a noxious laser as the pain stimulus, researchers compared the brain activity in pain-related areas of the brain during meditation and in a non-meditative state. During meditation, there was a dramatic reduction in the primary (SI) and secondary somatosensory cortices, the thalamus, and the insula and cingulate cortex.

Kelly's note: These findings are particularly fascinating because of their "completeness". Rather than finding reduced activity in one pain center of the brain, there was a reduction in the thalamus (which relays sensory information), the sensory cortex (which receives and processes sensory information), and the insula and cingulate cortex (which interprets the emotional aspects of pain). I think that this study has important implications for treating chronic pain, although it is not clear from this study whether these brain changes are available through basic meditation training, or whether they could be used in everyday life.

Authors: Kakigi, R., Nakata, H., Inui, K., Hiroe, N., Nagata, O., Honda, M., Tanaka, S., Sadato, N., & Kawakami, M.


Researchers at the Division of Rheumatology, University of Pennsylvania
School of Medicine, tested the effectiveness of an Iyengar yoga practice for reducing the symptoms of osteoarthritis of the knee. This was a pilot study with a very small sample (although 11 individuals enrolled in the study, full before and after data is available for only 7). These participants were taught a 90-minute Iyengar yoga practice, once weekly for 8 weeks. After the 8-week intervention, participants reported a significant reduction in pain, physical impairments, and negative emotions associated with their condition. The authors highlight the fact that 6 of the 7 participants were obese, and this study demonstrates the feasibility of using Yoga as an intervention with obese individuals.

**Authors:** Kolasinski, S.L., Garfinkel, M., Tsai, A.G., Matz, W., Dyke, A.V., & Schumacher, H.R.

**Source:** *Journal of Alternative and Complementary Medicine*, 11, 689-93.

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**The metabolic cost of hatha yoga.**

Is a yoga practice a "good workout"? That's the basic orientation of this article, which provides some very interesting statistics about oxygen consumption and heart rate during a basic 30-minute hatha yoga routine of supine, sitting, and standing poses. Researchers at Texas State University compared the metabolic demands of this yoga practice to resting in a chair and walking on a treadmill at 3.5 miles per hour. Participants were 26 women (19-40 years old). Not surprisingly, the yoga practice required greater oxygen consumption and a higher heart rate than resting in a chair, but perhaps surprisingly to some, yoga required significantly less oxygen consumption and a lower heart rate than walking.

Researchers concluded that a basic yoga practice of varied poses is "a very light intensity" form of exercise, and "may be too low to provide a training stimulus for improving cardiovascular fitness". Researchers also stated that "these data demonstrate that hatha yoga may have little, if any, cardiovascular benefit."

**Kelly’s comments:** This article should be considered in the broader context of yoga's cardiovascular and cardiorespiratory health benefits. A study summarized last month reported that low-intensity yoga helps to prevent weight gain, through some mechanism other than creating large metabolic demands during the practice. Obesity plays a large role in cardiovascular diseases, and yoga may play a role in maintaining a healthy weight. Also, breath-centered yoga trains the cardiorespiratory systems, even without creating large metabolic demands, and the variety of asanas in a balanced yoga practice can improve general circulation. Finally, yoga's greatest contribution to cardiovascular health may be reducing stress, which takes a major toll on the CV system.
Yoga for cancer patients and survivors: A review.
Researchers at the UCLA's Cousins Center for Psychoneuroimmunology reviewed published, peer-reviewed research on the benefits of yoga for cancer patients and survivors. The studies reviewed found that yoga was associated with "modest improvements in sleep quality, mood, stress, cancer-related distress, cancer-related symptoms, and overall quality of life."
You can access the full text of this review for free.
Source: Cancer Control, 12(3):165-71.
Authors: Bower JE, Woolery A, Sternlieb B, Garet D.

Yoga practice is associated with attenuated weight gain in healthy, middle-aged men and women.
Researchers from the Division of Public Health Sciences at the Fred Hutchinson Cancer Research Center in Seattle conducted a major study of the association between regular yoga practice and weight gain after age 45. 15,550 adults, aged 53 to 57 years, provided retrospective reports of their physical activity (including yoga) during the past 10 years, as well as their current weight and their weights at ages 30 and 45. Researchers analyzed the results separately for individuals of a healthy weight (BMI < 25) and overweight individuals. Healthy-weight individuals who reported practicing yoga for four or more years gained an average of 3.1 lbs less than healthy-weight individuals who did not practice yoga for four or more years (9.5 lbs weight gain versus 12.6 lbs). Overweight individuals showed a more dramatic 18.5 lb difference (5.0 lbs weight loss for who individuals who reported practicing yoga for four or more years, versus 13.5 lbs weight gain among those who did not.) The authors conclude: "Although causal inference from this observational study is not possible, results are consistent with the hypothesis that regular yoga practice can benefit individuals who wish to maintain or lose weight."
Authors: Kristal AR, Littman AJ, Benitez D, White E.

Is Spirituality a Critical Ingredient of Meditation? Comparing the Effects of Spiritual Meditation, Secular Meditation, and Relaxation on Spiritual, Psychological, Cardiac, and Pain Outcomes.
Researchers at Bowling Green State University compared the mental, physical, and spiritual health benefits of secular and spiritual forms of meditation. Participants (68 college students) were taught either a spiritual meditation technique (a mantra meditation using "God is love" or a similar phrase), a non-spiritual meditation technique (using a phrase like "I am happy"), or a relaxation technique to practice for 20 min a day for two weeks. After two weeks, participants returned to the lab, practiced their technique for 20 min, and placed their hand in a cold-water bath of 2 degrees Celsius for as long as they could endure it. Participants practicing spiritual meditation tolerated pain almost twice as long as the other two groups. In addition, the spiritual meditation group showed positive mental and spiritual health gains: they reported greater decreases in anxiety, greater positive mood, greater spiritual health (i.e., "feeling close to God"), and more spiritual experiences than the other two groups. Heart rate decreased for all groups while they practiced their techniques; there was no difference in heart rate between groups.

Authors: Wachholtz AB, Pargament KI.
Source: Journal of Behavioral Medicine, Jul 28 2005 (online).

Loving-kindness meditation for chronic low back pain: results from a pilot trial.

Researchers from the Duke University Medical Center examined the benefits of a traditional Buddhist loving-kindness meditation for chronic low back pain. Loving-kindness meditation is a practice of cultivating love, good will, and compassion. Researchers conducted an 8-week loving-kindness program for individuals with chronic low back pain. Participants were randomly assigned to either the loving-kindness intervention or to standard care. Researchers assessed patients' pain, anger, and psychological distress before and after the intervention. The loving-kindness group showed significant improvements in pain and psychological distress, but the "standard care" group did not. In addition, the more that an individual practiced loving-kindness meditation on a specific day, the less pain they experienced that day, and the less anger the experienced the following day.

Authors: Carson JW, Keefe FJ, Lynch TR, Carson KM, Goli V, Fras AM, Thorp SR.

The relationship of yoga, body awareness, and body responsiveness to self-objectification and disordered eating.

This study, which received a lot of media attention, found that yoga practice is associated with greater body awareness, lower self-
objectification, greater body satisfaction, and fewer disordered eating attitudes, compared to aerobics exercise and no exercise. It is important to note that the study used a survey design, rather than a yoga intervention with random assignment. The author compared three groups of women who reported engaging in yoga (43 women), aerobic exercise (43 women), and neither yoga nor aerobic exercise (51 women). Because the study used questionnaires rather than interventions, it is unclear whether women with greater body awareness and satisfaction are more likely to practice yoga, or whether yoga (as hypothesized) actually improved body awareness and satisfaction.

Author: Daubenmier, J.J.
Source: Psychology of Women Quarterly, 29: 207.

Meditation reduces sympathetic activation and improves the quality of life in elderly patients with optimally treated heart failure: a prospective randomized study.

Geriatrics Service, Hospital das Clinicas, Sao Paulo University Medical School, Sao Paulo, Brazil.

Researchers at the Sao Paulo University Medical School in Sao Paulo, Brazil examined whether meditation can reduce sympathetic activation (considered an index of stress and a risk factor for cardiovascular disease) and improve quality of life in elderly persons with congestive heart failure (CHF). The study used a prospective, randomized intervention design. 19 patients with CHF, 74.8 +/- 6.7 years old, all receiving medical treatment, were randomized into two groups: a meditation group and a control group. The meditation group was given a 30-min audiotape to listen to at home, twice a day, for 12 weeks, plus a weekly meeting. The control group had weekly meetings, with no audiotape. After 14 weeks, the meditation group showed reduced sympathetic activation (measured by levels of noradrenaline), and the control group did not. The meditation group also reported improved quality of life. Conclusions: In elderly patients with optimally treated CHF, meditation reduced NE, improved quality of life, and the control group did not.


Yoga intervention for adults with mild-to-moderate asthma: a pilot study.

Researchers at the Yale-Griffin Prevention Research Center studied the
benefits of an Iyengar yoga intervention for asthma. This study was conducted in response to several previously published studies that reported that yoga and breath work can successfully improve asthma. Previous studies did not compare yoga/breathwork interventions to other interventions (other than usual medical care). This study compared the benefits of an Iyengar yoga intervention that included postures and breathwork with an intervention that included basic stretching only. In the yoga intervention, participants were taught 15 asanas (postures), pranayama (breathing), and dhyana (meditation). Participants were also given handouts and audiocassettes and encouraged to practice at home. The stretching intervention consisted of stretches based on the published guidelines of the American College of Sports Medicine, and did not include any of the postures or breathing techniques included in the yoga intervention. 62 participants (aged 18 to 76 years, with a mean age of 51 years) with mild-to-moderate asthma were randomly assigned to either the 4-week yoga intervention or 4-week stretching intervention. 45 of the original 62 completed the intervention and provided follow-up data. Outcomes - including the Mini Asthma Quality of Life Questionnaire, rescue inhaler use, spirometry, symptom diaries, and health care utilization - were evaluated at 4, 8, 12, and 16 weeks. Both the yoga and stretching groups showed significant improvements in postbronchodilator forced expiratory volume and morning asthma symptoms, but there was no significant differences between groups on any outcome measure. This study does not suggest that yoga has no benefit for asthma; it simply raises important questions about what unique benefits yoga confers compared to stretching. Authors: Sabina, A.B., Williams, A.L., Wall, H.K., Bansal, S., Chupp, G., & Katz, D.L.
Source: Annals of Allergy, Asthma, and Immunology, 94(5):543-8.

Cardiorespiratory synchronization during Zen meditation.
Researchers at the University of Witten/Herdecke in Herdecke, Germany studied the effects of meditation on a specific aspect of breathing: respiratory sinus arrhythmia, RSA. RSA is a natural pattern of heart rate variability - the heart beats faster during inhalation and slower during exhalation. Researchers measured this pattern of heart rate variability as 9 inexperienced meditators practiced two kinds of meditation: seated Zen meditation (breath and thought awareness), and Kinhin (walking) meditation. During both types of meditation, breathing rate lowered, the highest heart rate (during inhalation) lowered, and the lowest heart rate (during exhalation) increased, but the basic pattern of RSA was strengthened. This outcome is potentially interesting because reduced RSA has been associated with depression, the physical changes of aging, and even predicts death; higher RSA is often considered a sign of cardiovascular health. Authors: Cysarz, D., & Bussing, A.
Effect of Iyengar yoga therapy for chronic low back pain.

Researchers at the West Virginia University School of Medicine conducted a randomized control trial of Iyengar yoga for chronic low back pain.

Participants were self-referred from the community, and reported experiencing back pain for an average of 11.2 years. Participants were randomly assigned to either a 16-week yoga group, or a 16-week educational control group. 42 of the 60 participants who enrolled in the study completed the study. Participants reported on a variety of outcomes at baseline, the end of the 16-week intervention, and at a 3-month follow-up. The Iyengar yoga practice was associated with significant reductions in pain intensity, functional disability, and the use of pain medication, at both the 16-week point and the 3-month follow-up.

Note: A full report of the methodology of this study will be published in the upcoming (October 2005) *International Journal of Yoga Therapy*. This article will provide details about the study and yoga practice that will be of interest to yoga professionals interested in adopting the back pain protocol or conducting their own research.


Source: *Pain, 115*(1-2), 107-17.

Yoga helps chronic fatigue: A prospective observational study of treatments for unexplained chronic fatigue.

From the Department of Family Medicine, College of Medicine, University of Iowa, Iowa City and the Department of Family & Community Medicine, Medical College of Wisconsin, Milwaukee

Researchers conducted a prospective observational study to examine the effects of several commonly used therapies for chronic fatigue. 155 participants (135 women) were recruited from the Wisconsin Chronic Fatigue Syndrome Association, primary care clinics, and community chronic fatigue syndrome presentations. Participants had been experiencing chronic fatigue for at least 6 months, and for an average of 6.7 years.

Participants were not assigned to use any specific therapy, but reported the therapies that they tried over the course of two years. Participants
reported a wide variety of therapies, including: prescribed medications, non-prescribed supplements and herbs, lifestyle changes, alternative therapies (including yoga), and psychological support.

Yoga was associated with reduced fatigue at the two-year follow-up. The authors identified yoga as the most promising alternative therapy for chronic fatigue.

Authors: Bentler, S.E., Hartz, A.J., & Kuhn, E.M.  

Influence of Yoga & Ayurveda on self-rated sleep in a geriatric population.  
Note: The full article is available online for free.

Researchers at the Swami Vivekananda Yoga Research Foundation in Bangalore, India compared the sleep benefits of Yoga practice (physical postures, relaxation techniques, voluntarily regulated breathing and lectures on yoga philosophy) and an herbal Ayurvedic treatment.

120 residents in a home for the elderly were randomly assigned to three groups: Yoga, Ayurveda, and a Wait-list control (no intervention). Participants reported the quality of their sleep over three one-week periods: 1) baseline (before interventions), 2) after three months of intervention, and 3) after six months of intervention. Sleep benefits were found in the Yoga group only, at the 6-month point: The Yoga group showed a significant decrease in the time taken to fall asleep (approximate group average decrease: 10 min, P<0.05), an increase in the total number of hours slept (approximate group average increase: 60 min, P<0.05), and improvement in the feeling of being rested in the morning, based on a rating scale (P<0.05), after six months. The other groups showed no significant change.

This study should be recognized for its excellent design and large sample size.

Authors: Manjunath, N.K., & Telles, S.  
Source: *Indian Journal of Medical Research, 121*(5), 683-90.

Don’t Fall Asleep in a Yoga Pose?

Physicians at the Department of Neurology of the University of Washington Medical Center and the Veterans Affairs Puget Sound Health Care System in Seattle, Washington, report an interesting case study. A women taking several prescription pain, sleep, and anti-depressant medications fell
asleep in a straight-leg seated forward bend (paschimottanasana). When she woke up, she experienced profound lower extremity weakness and sensory abnormality. At a three-month follow-up, she was still experiencing symptoms. The authors write, “The pathophysiology of the lesion could be related to either stretch injury or proximal compression/infarct of the nerve in the gluteal region (distal to the sciatic notch), or a combination of both.”

Authors: Walker, M, Meekins, G, & Hu, SC.

Efficacy of Yoga on Pregnancy Outcomes
Researchers from the Vivekananda Yoga Research Foundation in Bangalore, India, investigated the effects of yoga practice during pregnancy on several birth outcomes: birthweight, preterm labor, and pregnancy complications. Three hundred thirty five (335) women attending the antenatal clinic at Gunasheela Surgical and Maternity Hospital in Bangalore, India, were enrolled between 18 and 20 weeks of pregnancy in a prospective, matched, observational study. 169 women were assigned to practice yoga for one hour daily; 166 women, in the control group, were assigned to walk 30 minutes twice a day. Women in the yoga group and control group were matched for age, parity, body weight, and Doppler velocimetry scores of umbilical and uterine arteries. The yoga practice included asanas, breathing, and meditation. Both groups engaged in their activity from the date of entry into the study until delivery. Participation by women in both groups was monitored by frequent telephone calls and activity diaries.

- The number of babies with birth weight ≥2500 grams was significantly higher (p < 0.01) in the yoga group.
- Preterm labor was significantly lower (p < 0.0006) in the yoga group.
- Complications such as isolated intrauterine growth retardation (IUGR) (p < 0.003) and pregnancy-induced hypertension (PIH) with associated IUGR (p < 0.025) were also significantly lower in the yoga group.
- There were no significant adverse effects noted in the yoga group.

The authors conclude: "An integrated approach to yoga during pregnancy is safe. It improves birth weight, decreases preterm labor, and decreases IUGR either in isolation or associated with PIH, with no increased complications."

Authors: Narendran, S, Nagarathna, R, Narendran, V, Gunasheela, S, & Nagendra, HR.

Aryuveda, Yoga, & Cardiovascular Disease
This article reviews research on the use of Ayurvedic treatments (including Yoga practice) for cardiovascular diseases. The authors conclude that there is sufficient evidence to support the use of Yoga in treating heart disease and hypertension. The authors conclude that there is not sufficient empirical evidence to support the use of any Ayurvedic herbal treatment for heart disease or hypertension. However, the authors believe that many herbs used by Ayurvedic practitioners show promise and could be appropriate for larger randomized clinical trials.

Authors: Mamtani, Ravinder, & Mamtani, Ronac  
Source: Cardiology in Review, 13(3), 155-162. 2005

Complementary Therapies for Pain, Anxiety, and Mood Disturbance

How can complementary medicine assist conventional cancer therapy? Authors Deng and Cassileth provide an excellent review of research and clinical trials of a wide variety of complementary therapies, including massage, meditation, acupuncture, and nutritional supplements. You can access the full report for free.

Authors: Deng, G., & Cassileth, B.R.  

Treatment of Chronic Insomnia with Yoga: A Preliminary Study with Sleep-wake Diaries.

Researchers from the Division of Sleep Medicine at Harvard Medical School reported promising results in a preliminary study of yoga for insomnia. 20 participants (18 women, 2 men, ages ranging from 30-64) with chronic insomnia (experiencing insomnia for longer than 6 months) practiced yoga daily for eight weeks. Participants received only one yoga training session, and practiced on their own for the duration of the trial. The practice was based on Kundalini Yoga, and included the following (as described by the study author):

"(1) long, slow, abdominal breathing with meditation on long, slow abdominal breathing for 1-3 min; (2) arms extended upwards at a 60° degree angle with the palms flat and facing upwards with meditation on the breath for 1-3 min; (3) arms extended horizontally to the sides with the wrists bent upwards and the palms facing away with meditation on the breath for 1-3 min; (4) hands clasped together at the sternum with the arms pushing the palms together with meditation on the breath for 1-3 min; (5) a breathing meditation called “Shabad Kriya.” Palms are resting in the lap facing upward with right over left and the thumbs touching. Eyes are 1/10 open and gaze is downwards past the tip of the nose. The inhale is in 4 segments or “sniffs,” followed by breath retention for 16 counts, and an exhale in 2 segments, so that the ratio of inhale:hold:exhale is 4:16:2.
During the inhale, the mantra “Sa, Ta, Na, Ma” is mentally recited with each segment. During the breath retention, this mantra is mentally repeated four times. During the exhale the mantra “Wahe Guru” is mentally recited concurrently with each exhale segment. Participants are encouraged to maintain the overall breathing frequency as slow as is comfortable, while maintaining the specified ratio of inhale:hold:exhale for up to 11 min."

Participants kept track of the sleep time, sleep quality, and sleep disruptions in sleep-wake diaries. The yoga intervention was associated with improvements in total sleep time, total wake time, sleep efficiency, sleep onset latency, and wake time after sleep onset.

The lack of a control group makes it impossible to compare these improvements to improvements that occur naturally over time. However, given that this group suffered from chronic insomnia, it is less likely that these improvements were all due to chance or natural progression. The authors consider several ways that yoga can improve insomnia, most notably by reducing stress-related arousal.

Author: Khalsa, S.B.

**Ujjayi Breath Training Changes Everyday Breathing Patterns.**
Researchers at the Universite de la Mediterranee in France studied the effects of ujjayi breath training on everyday breathing patterns. Researchers measured the resting breathing patterns of participants before and after a two-month yoga respiration training program. The training program focused on slow, deep ujjayi breathing, with breath retention after both the inhalation and exhalation. After the training, participants showed a significant increase in exhalation duration (how long the exhale takes) and a modest increase in tidal volume (how much air is inhaled with each breath). These two findings are probably not independent; a deeper, more complete exhalation creates the space for a larger inhalation.

Authors: Villien F, Yu M, Barthelemy P, Jammes Y.

**Effect of Zen Meditation on Serum Nitric Oxide Activity and Lipid Peroxidation.**
Of all of the physiological risk factors for cardiovascular disease, and other diseases, ones you don't often read about are nitric oxide activity and lipid peroxidation. However, research suggests that nitric oxide is an important regulator of heart beat, blood flow, and blood vessel constriction. Lipid peroxidation is a process associated with cellular damage in the body. The following study - conducted by researchers at the Department of Psychiatry, College of Medicine, and Institute of Natural Medicine at Hallym
University, in South Korea - examined the effect of Zen meditation on these risk factors for cardiovascular and other diseases.

- Researchers compared 20 subjects who had practiced Zen Meditation at the Meditation Center in Seoul, South Korea, with a control group of 20 subjects who did not practice any formal stress management technique. Members of the meditation and control groups were matched according to age and sex, to reduce the impact of these variables on the comparison.

- The meditation group showed a significant higher level of nitric oxide production, and a significantly reduced level of lipid peroxidation, compared to control group.

These findings suggest that regular Zen meditators may be at reduced risk for certain diseases. However, this was not a randomized clinical trial, so researchers could not rule out other factors that may have accounted for the observed differences.

**Authors:** Kim D.H., Moon Y.S., Kim H.S., Jung J.S., Park H.M., Suh H.W., Kim Y.H., & Song D.K.

**Source:** *Prog Neuropsychopharmacol Biol Psychiatry, 29;*:327-31. Feb 2005

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**Meditation and Yoga Reduce Emotional Stress of Chronic Pain**

Chronic pain, which affects more than 100 million Americans, is notoriously difficult to treat. Traditional Western medical approaches often fail to reduce the physical and emotional suffering associated with chronic pain. Meditation and yoga have long been used to reduce the physical symptoms of chronic pain. Now, a study shows that meditation and yoga can also help individuals deal with the emotional side of chronic pain.

Chronic pain can put close relationships under a great deal of stress, make work and other everyday tasks impossible, and challenge even the strongest self-image. These psychological losses can be more stressful than the physical pain itself. For this reason, chronic pain is often associated with depression and anxiety.

Researchers at the University of Florida, Gainesville, examined whether mindfulness practices could reduce the emotional toll of chronic pain. 39 individuals with chronic pain (29 women) attended eight weekly mindfulness sessions and practiced at home daily. Sessions and home practices included breath meditation, body awareness, and gentle hatha yoga. 18 individuals with chronic pain (11 women) served as a control group, and did not participate in any sessions or home practice. Although there were no differences between these two groups at the beginning of the study, the meditation and yoga group reported significantly less depression and anxiety at the end of the eight weeks.
What might account for these changes? Researchers found that the meditation and yoga group also reported a decrease in maladaptive coping strategies (such as avoidance or pessimism) over the course of the study. Meditation and yoga may help individuals face, and come to terms with, the emotional and practical losses associated with chronic pain. Researchers concluded that mindfulness practices can be an important part of chronic pain treatment.

These findings are consistent with other studies that have shown meditation and yoga to be helpful at reducing anxiety and depression. By showing us how to accept the present moment, mindfulness practices may reduce the psychological costs of any major loss.

**Authors:** Sagula, D., & Rice, K.G.
**Source:** Journal of Clinical Psychology in Medical Settings, 11, 333-342.

**Tai Chi: improving functional balance and predicting subsequent falls in older persons.**

Researchers at the Oregon Research Institute examined whether Tai Chi training reduces falls in an elderly population.

- Participants were 256 healthy, physically inactive adults aged 70-92.
- Participants were randomly assigned to a 6-month Tai Chi training or 6-month stretching control group.
- Several balance measures were taken at baseline, 3 months into the training, 6 months into the training, and 6 month *after* the training. Participants also reported how many times the fell during the 6-month follow-up period (after the training).
- Tai Chi participants who showed improved balance at the end of the training significantly reduced their risk of falls during the 6-month follow-up, compared with those in the control condition.
- Conclusions: a training that improves functional balance does prevent falls.

These findings suggest that a yoga program that focuses on improving balance - through standing poses and mindful vinyasa - may also prevent falls in an elderly population. However, whenever osteoperosis is suspected, great care must be taken to prevent falls during the training!

**Authors:** Li, Harmer, Fisher, & McAuley.

**Action Observation and Acquired Motor Skills: An fMRI Study with Expert Dancers.**

Researchers studied the brain activity associated with watching movement (ballet and capoeira), and compared the brain activity of individuals trained in the movement form with the brain activity of individuals *not* trained in the movement form. Although the researchers did not study
yoga, I think that the results of the study are useful for teachers of any movement form.

- Participants were trained either in ballet, capoeira, or neither.
- Participants watched videotapes of ballet and capoeira.
- When participants watched the movement forms they were trained in, areas of the brain associated with movement planning (i.e., premotor cortex) were active.
- When participants watched the movement forms they were not trained in, areas of the brain associated with movement planning were not as active.

These findings can remind teachers that beginners in any movement form - including yoga - cannot learn as quickly from demonstrations as experienced students. We develop expertise that allows us to easily learn from demonstration, as we study a movement form.

Authors: Calvo-Merino, Glaser, Grezes, Passingham, & Haggard.
Source: *Cerebral Cortex*. Dec 2004.

**Standing and supine hamstring stretching are equally effective.**
Researchers at the New Hampshire Musculoskeletal Institute compared the effectiveness of standing and supine (reclining) hamstring stretching.

- The participants were 29 adult volunteers (22 women and 7 men) who showed limited hamstring flexibility. The mean age of participants was 26, with a standard deviation of +/- 6.13 years.
- Participants were randomly assigned a different stretch (standing or supine) for each leg.
- Each leg was stretched for 3 times for 30 seconds each, 3 days per week, for 3 weeks. Stretching sessions were supervised by physical therapists.
- Hamstring flexibility, measured by knee extension, was measured before and after the 3-week stretching program.
- There was significant improvement for both types of stretch, and no significant difference between the 2 stretches or between the sexes.

While not earth-shattering, this study is a good reminder that there is no one perfect pose for any given intention.

Authors: Decoster, Scanlon, Horn, & Cleland.

**Evidence underlying breathing retraining in people with stable chronic obstructive pulmonary disease.**
Researchers from the Physical Therapy Department of Husson College in Bangor, Maine, reviewed the usefulness of two yogic breathing techniques for individuals with chronic obstructive pulmonary disease (COPD).
• The two techniques were pursed-lip breathing (PLB) and diaphragmatic breathing (DB). Pursed-lip breathing involves breathing through a narrowed airway (the lips make a small channel for the breath to pass through), whereas diaphragmatic breathing emphasizes the fullness of the breath and the use of the diaphragm to inhale.
• The researchers’ review of other previously published studies concludes that PLB is particularly effective for individuals with COPD, because PLB slows the breathing rate, decreases the resistive pressure drop across the airways, and decreases airway narrowing during expiration.
• Diaphragmatic breathing does not appear to be as consistently beneficial for COPD.

Pursed breathing is an excellent technique to practice anytime you want to lower breathing rate; it is recommended not just for breathing disorders, but for panic attacks, insomnia, and hyperventilation.

Authors: Dechman & Wilson.

Impact of meditation on resting and ambulatory blood pressure and heart rate in youth.
Researchers at the Medical College of Georgia, in Augusta, GA, investigated the effects of meditation on blood pressure and heart rate in youth.
• 73 middle school students (age 12.3 +/- 0.6 years) were randomly assigned to either a meditation group (N = 34) or a health education control group (N = 39) group.
• The meditation group meditated for 10 minutes at school and after school (at home) every day for 3 months.
• Blood pressure and heart rate were measured pre-test (pre-meditation training) and post-test (after the 3 months). Researchers took both resting (seated) and ambulatory (walking around in everyday life) measures of blood pressure and heart rate. Resting blood pressure and heart rate were measured on three consecutive school days (to increase reliability of the measurements). Ambulatory measurements were recorded over 24-hour periods at pretest and posttest every 20 minutes during self-reported normal waking hours and every 30 minutes during self-reported normal sleep hours.
• Compared to students in the control group, students in the meditation group showed a significant decrease in resting blood pressure, daytime ambulatory blood pressure after school, and daytime ambulatory heart rate after school.
• Authors conclusions: “These findings demonstrate the potential beneficial impact of meditation on blood pressure and heart rate in the natural environment in healthy normotensive youth.”

Authors: Barnes, Davis, Murzynowski, & Treiber.
The effects of yoga training and a single bout of yoga on delayed onset muscle soreness in the lower extremity.

Researchers at the Department of Exercise Science and Sports Studies at Springfield College Allied Health Sciences in Springfield, Massachusetts, examined whether yoga influences muscles soreness after exertion.

- Researchers considered the effects of both yoga training (individuals who regularly practiced yoga) and a single yoga session.
- Muscle soreness was measured at baseline, and 24, 48, 72, 96, and 120 hours after a session of bench stepping (designed to create muscle fatigue and soreness).
- Individuals who regularly practiced yoga were less sore 24 and 48 hours post-exercise, compared to individuals who did not regularly practice yoga.
- In addition, soreness was significantly reduced after the single yoga class.

Authors: Boyle, Sayers, Jensen, Headley, & Manos.

November 2004: Although not a research report, “Breathing Lessons” by Mary P. Guerrera, MD is a thoughtful essay on the role of breathing exercises in clinical medicine and teaching. It appears in the November 2004 volume of the journal *Family Medicine*.

Effects of hatha yoga and african dance on perceived stress, affect, and salivary cortisol.
Researchers from Reed College, the University of California (San Francisco), and Oregon Health Sciences University examined the psychological and neuroendocrine effects of yoga and dance.

- Sixty-nine healthy college students participated in one of three 90 minute classes: African dance (21 students), Hatha yoga (18 students), or a biology lecture (30 students). 65% of participants were women; the mean age of participants was 19. All 3 classes were held in the afternoon. A serious short-coming of this study is that participants were not randomly assigned to the classes - they selected which class they wanted to participate in.
- Before and after the class, participants completed two self-report measures: the Perceived Stress Scale (PSS), and the Positive Affect and Negative Affect Schedule (a measure of positive and negative emotions). Participants also provided saliva samples for cortisol analysis (cortisol is a stress hormone; saliva levels reflect both
psychological states as well as a number of other factors, including time of day).

- Both dance and yoga decreased perceived stress and negative affect. Only dance increased positive affect. Only yoga decreased salivary cortisol. These results are consistent with previous studies: most forms of exercise increase salivary cortisol (simply because of increased physiological arousal), but yoga decreases cortisol (possibly because yoga practice ends with relaxation).

Elevated cortisol is associated with a number of psychological (i.e., depression) and physical (i.e., immune suppression) illnesses. Yoga may improve well-being by lowering cortisol; however, cortisol measurements alone do not support a strong argument. These results also remind me of a theory that I've long had about why many people seek yoga and meditation. I've suspected that many people who find benefit in yoga and meditation are looking for an end to some suffering, rather than a "high" or pleasure. These results suggest that yoga is primarily working on reducing negative experiences, rather than boosting intense positive states.

Authors: West, Otte, Geher, Johnson, & Mohr

Does yoga speed healing for patients with low back pain?

Researchers at the University of Texas Southwestern Medical Center reviewed previously published studies on the effectiveness of yoga for low back pain.

- The authors concluded that while there is some evidence that yoga can improve back pain, the number and quality of well-designed studies prevents them from making a strong recommendation for yoga as superior to other therapeutic approaches to back pain.

Authors: Graves, Krepcho, Mayo, & Hill.

Prospective study of new participants in a community-based mind-body training program.

Researchers at the Center for Complementary and Integrative Medicine, Weill Medical College of Cornell University investigated changes in emotional and physical well-being after 171 participants completed a mind-body training program that included yoga.

- After 3 months of training, participants improved in all domains (mental health, emotions, social relationships, vitality, general health, and body pain).

- Before the intervention, the participants were, on average, significantly below the national average on many of the domains. This suggests that the intervention was effective for individuals with poorer health/quality of life.
• No control condition was included, making a comparison of the mind-body program to other interventions impossible.

**Authors:** Lee, Mancuso, & Charlson.


**A pilot study of a yoga and meditation intervention for dementia caregiver stress.**

Researchers at the Pacific Graduate School of Psychology examined the effects of a six-session yoga-meditation program (called Inner Resources) designed to help caregivers cope with stress.

• The participants were 12 older female caregivers (eight Latinas and four Caucasians) who were currently caring for a family member with dementia.

• Pre/post comparisons showed statistically significant reductions in depression and anxiety and improvements in perceived self-efficacy.

• The amount of time spent in weekly yoga-meditation practice was significantly associated with improvements in depression.

• The participants also reported subjective improvements in physical and emotional functioning.

• No control group was included, making comparison of the yoga-meditation program to other interventions impossible.

**Authors:** Waelde, Thompson, & Gallagher-Thompson.


**Randomized controlled trial of yoga and exercise in multiple sclerosis.**

Researchers in the Department of Neurology at Oregon Health & Science University examined the effects of yoga and aerobic exercise on cognitive function, fatigue, mood, and quality of life in individuals with multiple sclerosis:

• 69 individuals with multiple sclerosis were randomly assigned to one of three groups lasting 6 months: weekly Iyengar yoga class along with home practice, weekly exercise class using a stationary bicycle along with home exercise, or a waiting-list control group. (57 participants completed the study.)

• Neither yoga nor aerobic exercise had a significant effect on participants' attention, alertness, or mood.

• Both yoga and aerobic exercise was associated with improvement in energy and fatigue, compared to the control group.

**Authors:** Oken, Kishiyama, Zajdel, Bourdette, Carlsen, Haas, Hugos, Kraemer, Lawrence, & Mass.


This list update began in June 2004. You can search for earlier studies at the free online database of published medical research:

[http://www.pubmed.org](http://www.pubmed.org)
You can also watch for updates at http://www.openmindbody.com/yogaresearch.html