

Natural Therapies Review 2019-20

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Yoga Australia Submission of citations for published scientific research studies

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2020							
Kuppusamy M, Kamaldeen D, Pitani R, Amaldas J, Ramasamy P, Shanmugam P, Vijayakumar V	2020	Effects of yoga breathing practice on heart rate variability in healthy adolescents: a randomized controlled trial	Integrative Medicine Research	Mar;9(1)	28 - 32	10.1016/j.imr.2020.01.006	Background: This study was conducted among healthy adolescents to assess the effects of a yoga breathing practice (Bhramari pranayama, Bhr.P) towards cardiac autonomic function using heart rate variability (HRV) parameters. Methods: Of the 730 eligible subjects screened, 520 healthy adolescents who met the inclusion and exclusion criteria were randomly assigned to either yoga breathing group (n = 260) or control group (n = 260). The yoga breathing group practiced Bhr.P. five days a week for a duration of six months while the control group continued with their daily routine without any intervention. Outcome measures were time and frequency domain of HRV in both groups which were assessed before and after the intervention using Lead II ECG. Linear models were used in the analysis of short term HRV. Results: After 6 months of yoga breathing, the time domain parameters of short term HRV showed significant (P < 0.05) improvement towards the parasympathetic domain. Frequency domain parameters also showed the same direction of changes. In contrast, control group subjects showed a trend towards a sympathetic domain. Conclusion: The present study showed a positive shift in cardiac autonomic modulation towards parasympathetic predominance after 6 months of yoga breathing practice among apparently healthy adolescents.
2019							
Cramer H, Haller H, Klose P, Ward L, Chung VC, Lauche R	2019	The risks and benefits of yoga for patients with chronic obstructive pulmonary disease: a systematic review and meta-analysis.	Clinical Rehabilitation	Dec;33(12)	1847-1862	10.1177/0269215519860551	Objectives: To determine the effectiveness and safety of yoga interventions on disease symptoms, quality of life and function in patients diagnosed with chronic obstructive pulmonary disease (COPD). Data sources: Medline/PubMed, Scopus, and CENTRAL (Cochrane Central Register of Controlled Trials) were searched through 6 June 2019. Review methods: Randomized controlled trials assessing the effects of yoga on quality of life, dyspnea, exercise capacity, and pulmonary function (FEV1) in patients with COPD were included. Safety was defined as secondary outcome. Mean differences (MD) and standardized mean differences (SMD) with 95% confidence intervals (CIs) were computed. Risk of bias was assessed using the Cochrane tool. Results: Eleven randomized controlled trials with a total of 586 patients were included. Meta-analysis revealed evidence for effects of yoga compared to no treatment on quality of life on the COPD Assessment Test (MD = 3.81; 95% CI = 0.97 to 6.65; P = 0.009, I ² = 70%), exercise capacity assessed by the 6-minute walk test (MD = 25.53 m; 95%

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							<p>CI = 12.16 m to 38.90 m; P = 0.001, I² = 0%), and pulmonary function assessed by FEV1 predicted (MD = 3.95%; 95% CI = 2.74% to 5.17%; P < 0.001, I² = 0%). Only the effects on exercise capacity and pulmonary function were robust against methodological bias. Effects were only present in breathing-focused yoga interventions but not in interventions including yoga postures. Adverse events were reported infrequently.</p> <p>Conclusion: This meta-analysis found robust effects of yoga on exercise capacity and pulmonary function in patients with COPD. Yoga, specifically yoga breathing techniques, can be an effective adjunct intervention for patients with COPD. Yoga's safety needs to be assessed in more depth in future studies.</p>
Christa E, Srivastava P, Chandran DS, Jaryal AK, Yadav RK, Roy A, Deepak KK	2019	Effect of yoga-based cardiac rehabilitation on heart rate variability: randomized controlled trial in patients post-MI	International Journal of Yoga Therapy	29 (1)	43-50	10.17761/2019-00019	<p>Background: Autonomic dysfunction is an independent predictor of cardiovascular and all-cause mortality after myocardial infarction (MI). We tested the effects of a 12-week yoga-based cardiac rehabilitation program on heart rate variability (HRV) in 80 patients post-MI. This randomized controlled trial with two parallel groups was carried out in a tertiary care institution in India. The yoga group received 13 hospital-based structured yoga sessions as an adjunct to standard care. Control group participants received enhanced standard care involving three brief educational sessions with a leaflet on the importance of diet and physical activity. HRV was measured in all participants with lead II electrocardiogram (ECG) signals. One yoga group patient's data were excluded due to ECG abnormalities. Baseline measurement was done 3 weeks post-MI, and post-intervention assessment took place at the 13th week. HRV frequency and time domain indices were analyzed. There were no significant between - group differences in the HRV time domain indices. Frequency domain indices showed significant between-group differences in HF power (absolute) (yoga vs. control: 114.42 [-794.80-7,993.78] vs. -38.14 [-4,843.50-1,617.87], p = 0.005) and total power (nu) (yoga vs. control: 44.96 [21.94] vs. -19.55 [15.42], p = 0.01) with higher HF power and total power (nu) in the yoga group. It should be noted that these results cannot be generalized to high risk patients. Respiratory frequency control to check for influence of respiratory rate on RR interval was not evaluated. Conclusion: This short-term yoga-based cardiac rehabilitation program had additive effects in shifting sympathovagal balance toward parasympathetic predominance while increasing overall HRV in optimally medicated post-MI patients.</p>

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Djalilova DM, Schulz PS, Berger AM, Case AJ, Kupzyk KA, Ross AC	2019	Impact of yoga on inflammatory biomarkers: a systematic review	Biological Research for Nursing	Mar;21(2)	198-209	10.1177/1099800418820162	Background: Many chronic conditions, including heart disease, cancer, and rheumatoid arthritis, are associated with underlying chronic inflammatory processes. Literature reviews have analyzed a variety of integrative therapies and their relationships with chronic inflammation. This systematic review is unique in reporting solely on yoga's relationship with inflammation. Its purpose was to synthesize current literature examining the impact of yoga interventions on inflammatory biomarkers in adults with chronic inflammatory-related disorders. Method: Searches of several electronic databases were conducted. Inclusion criteria were (a) English language, (b) sample age >18 years old, (c) yoga interventions involving postures with or without yoga breathing and/or meditation, and (d) measured inflammatory biomarkers. Results: The final review included 15 primary studies. Of these, seven were rated as excellent and eight as average or fair. There was considerable variability in yoga types, components, frequency, session length, intervention duration, and intensity. The most common biomarkers measured were interleukin-6 (n = 11), C-reactive protein (n = 10), and tumor necrosis factor (n = 8). Most studies reported positive effects on inflammatory biomarkers (n = 11) from baseline to post yoga intervention. Analysis of the dose showed higher total dose (>1,000 min) resulted in greater improvements in inflammation. Conclusion: This review suggests that yoga can be a viable intervention to reduce inflammation across a multitude of chronic conditions. Future studies with detailed descriptions of yoga interventions, measurement of new and well-established inflammatory biomarkers, and larger sample sizes are warranted to advance the science and corroborate results.
Dong B, Xie C, Jing X, Lin L, Tian L	2019	Yoga has a solid effect on cancer-related fatigue in patients with breast cancer: a meta-analysis	Breast Cancer Research and Treatment	Aug;177(1)	5-16	10.1007/s10549-019-05278-w	Purpose: This study was designed to critically evaluate the effect of yoga on cancer-related fatigue in patients with breast cancer. Methods: Eight databases (Cochrane Library, PubMed, Ovid-Medline, Web of Science, CBM, Wanfang, VIP, and CNKI) were systematically reviewed from inception to January 2019 for randomized controlled trials (RCTs). Two reviewers critically and independently assessed the risk of bias using Cochrane Collaboration criteria and extracted correlated data using the designed form. All analyses were performed with Review Manager 5.3. Results: A total of 17 qualified studies that included 2183 patients (yoga: 1112, control: 1071) were included in the meta-analysis. Yoga had a large effect on fatigue in post-treatment breast cancer patients and had a small effect on intra-treatment patients. The meta-analysis also indicated that supervised yoga class had a significant effect on CRF; the six-week

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							program had a moderate beneficial effect while the 60/90 min/session supervised yoga class and the eight-week program demonstrated a large effect on fatigue in patients with breast cancer. Yoga could markedly mitigate the physical fatigue in breast cancer patients, had a medium impact on cognitive fatigue, and manifested a small effect on mental fatigue. Eight studies reported the adverse events, whereas ten studies did not. Conclusion: Yoga can be considered as an alternative therapy for relieving fatigue in breast cancer patients who have completed treatment or are undergoing anti-cancer treatment.
Green E, Huynh A, Broussard L, Zunker B, Matthews J5 Hilton CL, Aranha K	2019	Systematic review of yoga and balance: effect on adults with neuromuscular impairment	American Journal of Occupational Therapy	Jan/Feb;73(1):	730120-730120 5150p1-5150p1	10.5014/ajot.2019.028944	This systematic review examines the efficacy of yoga as a neuromuscular intervention for community-dwelling populations at risk for falls to determine its utility for use in occupational therapy intervention. Populations included older adults and adults with traumatic brain injury (TBI), cerebrovascular accident (CVA), dementia and Alzheimer's disease (AD)-type dementia, multiple sclerosis (MS), and Parkinson's disease (PD). Benefits of yoga include improved posture control, improved flexibility of mind and body, relaxation, and decreased anxiety and stress. A systematic review of the literature was conducted to understand the salutary benefits of yoga for clients who are at risk for falls because of neuromuscular issues. Conclusion: Moderate evidence supports the use of yoga to decrease the risk for falls for community-dwelling older adults and people with CVA, dementia and AD-type dementia, and MS. Studies involving people with TBI and PD did not include strong enough evidence to be able to make a clear classification.
Gothe NP, Khan I, Hayes J, Erlenbach E, Damoiseau x JS	2019	Yoga effects on brain health: a systematic review of the current literature	Brain Plasticity	Dec 26;5(1)	105-122	10.3233/BPL-190084.	Background: Yoga is the most popular complementary health approach practiced by adults in the United States. It is an ancient mind and body practice with origins in Indian philosophy. Yoga combines physical postures, rhythmic breathing and meditative exercise to offer the practitioners a unique holistic mind-body experience. While the health benefits of physical exercise are well established, in recent years, the active attentional component of breathing and meditation practice has garnered interest among exercise neuroscientists. As the scientific evidence for the physical and mental health benefits of yoga continues to grow, this article aims to summarize the current knowledge of yoga practice and its documented positive effects for brain structure and function, as assessed with MRI, fMRI, and SPECT. We reviewed 11 studies examining the effects of yoga practice on the brain structures, function and cerebral blood flow. Conclusion: Collectively, the studies

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							demonstrate a positive effect of yoga practice on the structure and/or function of the hippocampus, amygdala, prefrontal cortex, cingulate cortex and brain networks including the default mode network (DMN). The studies offer promising early evidence that behavioral interventions like yoga may hold promise to mitigate age-related and neurodegenerative declines as many of the regions identified are known to demonstrate significant age-related atrophy.
Jin X, Wang L, Liu S, Zhu L, Loprinzi PD, Fan X	2019	The impact of mind-body exercises on motor function, depressive symptoms, and quality of life in Parkinson's disease: a systematic review and meta-analysis	International Journal of Environmental Research and Public Health	Dec 18;17(1)	pii: E31	10.3390/ijerph17010031.	<p>Purpose: To systematically evaluate the effects of mind-body exercises (Tai Chi, Yoga, and Health Qigong) on motor function (UPDRS, Timed-Up-and-Go, Balance), depressive symptoms, and quality of life (QoL) of Parkinson's patients (PD). Methods: Through computer system search and manual retrieval, PubMed, Web of Science, The Cochrane Library, CNKI, Wanfang Database, and CQVIP were used. Articles were retrieved up to the published date of June 30, 2019. Following the Cochrane Collaboration System Evaluation Manual (version 5.1.0), two researchers independently evaluated the quality and bias risk of each article, including 22 evaluated articles. The Pedro quality score of 6 points or more was found for 86% (19/22) of these studies, of which 21 were randomized controlled trials with a total of 1199 subjects; and the trial intervention time ranged from 4 to 24 weeks. Interventions in the control group included no-intervention controls, placebo, waiting-lists, routine care, and non-sports controls. Meta-analysis was performed on the literature using RevMan 5.3 statistical software, and heterogeneity analysis was performed using Stata 14.0 software. Results: (1) Mind-body exercises significantly improved motor function in PD patients, including UPDRS (SMD = -0.61, $p < 0.001$), TUG (SMD = -1.47, $p < 0.001$) and balance function (SMD = 0.79, $p < 0.001$). (2) Mind-body exercises also had significant effects on depression (SMD = -1.61, $p = 0.002$) and QoL (SMD = 0.66, $p < 0.001$). (3) Among the indicators, UPDRS ($I^2 = 81\%$) and depression ($I^2 = 91\%$) had higher heterogeneity; according to the results of the separate combined effect sizes of TUG ($I^2 = 29\%$), Balance ($I^2 = 16\%$) and QoL ($I^2 = 35\%$), it shows that the heterogeneity is small; (4) After meta-regression analysis of the age limit and other possible confounding factors, further subgroup analysis showed that the reason for the heterogeneity of UPDRS motor function may be related to the sex of PD patients and severity of the disease; the outcome of depression was heterogeneous. The reason for this may be the use of specific drugs in the experiment and the duration of</p>

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							intervention in the trial. Conclusion: (1) Mind-body exercises were found to have significant improvements in motor function, depressive symptoms, and quality of life in patients with Parkinson's disease, and can be used as an effective method for clinical exercise intervention in PD patients. (2) Future clinical intervention programs for PD patients need to fully consider specific factors such as gender, severity of disease, specific drug use, and intervention cycle to effectively control heterogeneity factors, so that the clinical exercise intervention program for PD patients is objective, scientific, and effective.
Justice L, Brems C	2019	Bridging body and mind: case series of a 10-week trauma-informed yoga protocol for veterans	International Journal of Yoga Therapy	29(1)	65-79	10.17761/D-17-2019-00029	This case series explored the feasibility and preliminary efficacy of therapeutic yoga as a complementary form of treatment for combat-related trauma. The series recruited for and implemented a 10-week Trauma-Informed Yoga protocol for veterans in an inter-professional community health treatment setting. Participants were enrolled in a series of 90-minute therapeutic yoga classes adapted to be trauma-informed. Feasibility was measured by recruitment, retention, and level of participation in the study. Preliminary efficacy was explored via the Posttraumatic Stress Disorder Checklist, Scale of Body Connection, PROMIS - 29, PROMIS Alcohol Use, PROMIS Substance Use, Difficulties in Emotional Regulation Scale, and Self-Compassion Scale–Short Form. All measures were administered at baseline, week 5, week 10, and at a 5-week follow up. A qualitative Feasibility Questionnaire was administered weekly and at the 5-week follow-up to assess barriers and motivators for home practice and to collect feedback about session content. Recruitment challenges resulted in only seven interested individuals. Four participants (three males, one female) were successfully enrolled in the study after seven phone screenings and five in-person interviews. The four enrolled clients had a 100% follow-up retention rate, reported no adverse events, and on average participated in 85% of classes. Clinically significant enhancements were observed on trauma- and body connection–related scales for three participants from baseline to follow-up. Qualitative data revealed that motivators to practice include in-session philosophical discussions based on psychological themes; breath work; mindfulness; and physical, social, work/academic, and mental health impact. Barriers included motivation, time, and location. Important themes emerged related to cultural considerations for veterans. Although this 10-week trauma-informed protocol faced challenges to recruitment, retention and participation were

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							high. Efficacy measures yielded promising results for reducing trauma-related symptoms.
Maren Nyer, PhD; Cayla M. O'Hair, BA; Lindsey B. Hopkins, PhD; Regina Roberg, BA; Richard Norton, BS; Chris Streeter, MD	2019	Yoga as a treatment for depression: applications for mental health practitioners	Psychiatric Annals	49(1)	11-15	10.3928/00485713-20181203-01	Yoga is an ancient mind-body philosophy from the East, commonly associated in the West with physical postures (asana), breath work (pranayama), and meditation. Empirical research has found generally positive effects, with yoga practice and interventions associated with reduced symptoms of depression. This article provides a brief introduction to yoga philosophy and an overview of the current empirical support for yoga as a treatment for depression. Yoga as a monotherapy versus treatment augmentation strategy, as well as potential physiological mechanisms of action and transdiagnostic use, are briefly addressed. Clinical considerations are also discussed from the perspective of the mental health clinician.
Ramamoorthi R, Gahreman D, Skinner T, Moss S	2019	The effect of yoga practice on glycemic control and other health parameters in the prediabetic state: A systematic review and meta-analysis.	PLoS One	Oct 16;14(10)	e0221067	10.1371/journal.pone.0221067	A systematic review and meta-analysis was conducted to investigate the effects of yoga on glycemic control, lipid profiles, body composition and blood pressure in people in the pre-diabetic state. Studies on the effectiveness of yoga on population groups under high risk for diabetes, called prediabetic or suffering from metabolic syndromes were extracted from a thorough search of PubMed, Scopus, Cochrane Library, EBSCO and IndMED databases. Both Randomised Controlled Trial (RCT) and non-RCT studies were included in the systematic review and meta-analysis. Studies published between Jan 2002 and Dec 2018 were included. Studies were considered for evaluation if they investigated a yoga intervention to prevent T2DM, against a control group, while also reporting glycemic control and other health parameters of T2DM management. Summary effect sizes and 95% confidence intervals (CI) were calculated using the Comprehensive Meta-Analysis software in addition to publication bias. Of the 46,500 identified studies, 14 studies with 834 participants of whom were 50% women, were found to be eligible for inclusion in our systematic review. Quantitative synthesis included 12 randomized control trials and 2 non-randomized control trials, with the follow-up period ranging from 4 to 52 weeks. Compared to controls, yoga intervention improved fasting blood glucose (FBG) [Standard Mean Difference (SMD) -0.064 mg/dL (95% CI -0.201 to

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							0.074)]; low density lipoprotein (LDL) [SMD-0.090 mg/dL (95% CI -0.270 to 0.090)]; triglycerides [SMD -0.148 mg/dL (95% CI -0.285 to -0.012)]; total cholesterol [SMD -0.058 mg/dL (95% CI -0.220 to 0.104)] and systolic blood pressure [SMD -0.058 mm Hg (95% CI -0.168 to 0.053)]. This meta-analysis uncovered clinically improved effects of yoga intervention on glycemic control, lipid profiles and other parameters of T2DM management in prediabetic population. These results suggest that yoga intervention may be considered as a comprehensive and alternative approach to preventing T2DM. Further adequately powered, well designed RCTs are needed to support our findings and investigate the long-term effects of yoga in T2DM patients.
Sivaramakrishnan D, Fitzsimons C, Kelly P2, Ludwig K, Mutrie N, Saunders DH, Baker G	2019	The effects of yoga compared to active and inactive controls on physical function and health related quality of life in older adults-systematic review and meta-analysis of randomised controlled trials	International Journal of Behavioral Nutrition and Physical Activity	Apr 5;16(1)	33	10.1186/s12966-019-0789-2	Background: Yoga has been recommended as a muscle strengthening and balance activity in national and global physical activity guidelines. However, the evidence base establishing the effectiveness of yoga in improving physical function and health related quality of life (HRQoL) in an older adult population not recruited on the basis of any specific disease or condition, has not been systematically reviewed. The objective of this study was to synthesise existing evidence on the effects of yoga on physical function and HRQoL in older adults not characterised by any specific clinical condition. Methods: The following databases were systematically searched in September 2017: MEDLINE, PsycInfo, CINAHL Plus, Scopus, Web of Science, Cochrane Library, EMBASE, SPORTDiscus, AMED and ProQuest Dissertations & Theses Global. Study inclusion criteria: Older adult participants with mean age of 60 years and above, not recruited on the basis of any specific disease or condition; yoga intervention compared with inactive controls (example: wait-list control, education booklets) or active controls (example: walking, chair aerobics); physical function and HRQoL outcomes; and randomised/cluster randomised controlled trials published in English. A vote counting analysis and meta-analysis with standardised effect sizes (Hedges' g) computed using random effects models were conducted. Results: A total of 27 records from 22 RCTs were included (17 RCTs assessed physical function and 20 assessed HRQoL). The meta-analysis revealed significant effects (5% level of significance) favouring the yoga group for the following physical function outcomes compared with inactive controls: balance (effect size (ES) = 0.7), lower body flexibility (ES = 0.5), lower limb strength (ES = 0.45); compared with active controls: lower limb strength (ES = 0.49), lower body flexibility (ES = 0.28). For HRQoL, significant effects favouring yoga were found

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							compared to inactive controls for: depression (ES = 0.64), perceived mental health (ES = 0.6), perceived physical health (ES = 0.61), sleep quality (ES = 0.65), and vitality (ES = 0.31); compared to active controls: depression (ES = 0.54). Conclusion: This review is the first to compare the effects of yoga with active and inactive controls in older adults not characterised by a specific clinical condition. Results indicate that yoga interventions improve multiple physical function and HRQoL outcomes in this population compared to both control conditions. This study provides robust evidence for promoting yoga in physical activity guidelines for older adults as a multimodal activity that improves aspects of fitness like strength, balance and flexibility, as well as mental wellbeing.
Wahbeh H, Nelson M	2019	iRest meditation for older adults with depression symptoms: a pilot study	International Journal of Yoga Therapy	29(1)	9 -17	10.17761/2019-00036	Older adults, a rapidly growing population in the United States, have fewer physiological reserves and are more likely to be affected by stress, making them especially susceptible to depression symptoms. Meditation offers promising potential as an effective treatment; however, few studies have evaluated meditation interventions for this demographic. The objectives of this pilot study were to evaluate the feasibility and acceptability of an iRest meditation program in older adults with depression symptoms and to collect preliminary data on its effect on depression and depression-related symptoms compared to a vacation control. The study occurred at the Institute of Noetic Sciences Earth-Rise Retreat Center and participants' homes. Thirty generally healthy older adults, aged 55–90, with depression symptoms were recruited. Participants were randomly assigned to a 2-day retreat of either iRest meditation training or vacation. After the retreat, participants were asked to complete 20 minutes of home practice per day for 6 weeks; this consisted of either guided meditations (iRest) or music (vacation). Data were collected pre- and post-retreat and then 6 weeks later. Measures included depression-related variables (expectancy, depression symptoms, perceived stress, resilience, pain, sleep quality, and spirituality) and biomarkers (voice stress analysis, heart rate, heart rate variability). We found the iRest intervention for older adults with depression symptoms to be feasible and acceptable. Preliminary results at 6 weeks demonstrated improvements in sleep impairment in older adults compared to the control group and promising trends in improvements in depression symptoms and pain severity.

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Walter AA, Adams EV, Van Puymbroek M, Crowe BM, Urrea-Mendoza E, Hawkins BL, Sharp J, Woschkolup K, Revilla FJ, Schmid AA	2019	Changes in non-motor symptoms following an 8-week yoga intervention for people with Parkinson's disease	International Journal of Yoga Therapy	Nov;29(1)	91-99	10.17761/2019-00025	Parkinson's disease (PD) is a neurodegenerative disorder marked by progressive degenerative motor symptoms (e.g., tremors, impaired balance and gait) and non-motor symptoms (e.g., fatigue, sleep disturbances, pain) that can negatively influence health-related quality of life (HRQoL). Previous studies have shown that yoga for individuals with PD improves balance, strength, and mobility. However, little research has been conducted to determine the effect of yoga on non-motor symptoms of PD. The purpose of this study was to examine changes in non-motor symptoms among individuals with PD following an 8-week yoga intervention. Data used for analyses were part of a larger study that researched improvements in motor function for individuals with PD. Participants (N = 27) were randomly assigned to experimental (n = 15) and control (n = 12) groups and completed pre- and post-intervention quantitative measures. Within-group improvements were statistically significant for fatigue measured by the Parkinson's Fatigue Scale, balance confidence measured by the Activities Balance Confidence Scale, the belief in one's ability to manage falls measured by the Falls Management Scale, activity constraints measured by the Activities Constraint Questionnaire, and PD-specific quality of life measured by the Parkinson's Disease Questionnaire-8. Across - group changes were statistically significant for activity constraints. Findings indicate yoga may be an efficacious intervention for improving non-motor symptoms as well as HRQoL for individuals with PD
Wu Y, Johnson BT, Acabchuk RL, Chen S, Lewis HK, Livingston J, Park CL, Pescatello LS	2019	Yoga as antihypertensive lifestyle therapy: a systematic review and meta-analysis	Mayo Clinic Proceedings	Mar;94(3)	432-446	10.1016/j.mayocp.2018.09.023	Objective: To investigate the efficacy of yoga as antihypertensive lifestyle therapy and identify moderators that account for variability in the blood pressure (BP) response to yoga. Methods: We systematically searched 6 electronic databases from inception through June 4, 2018, for articles published in English language journals on trials of yoga interventions that involved adult participants, reported preintervention and postintervention BP, and had a non-exercise/non-diet control group. Our search yielded 49 qualifying controlled trials (56 interventions). We (1) evaluated the risk of bias and methodological study quality, (2) performed meta-regression analysis following random-effects assumptions, and (3) generated additive models that represented the largest possible clinically relevant BP reductions. Results: On average, the 3517 trial participants were middle-aged (49.2±19.5 years), overweight (27.9±3.6 kg/m ²) adults with high BP (systolic BP, 129.3±13.3 mm Hg; diastolic BP, 80.7±8.4 mm Hg). Yoga was practiced 4.8±3.4 sessions per week for 59.2±25.0 minutes per session for 13.2±7.5 weeks. On average, yoga elicited moderate

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							reductions in systolic BP (weighted mean effect size, -0.47; 95% CI, -0.62-0.32, -5.0 mm Hg) and diastolic BP (weighted mean effect size, -0.47; 95% CI, -0.61 to -0.32; -3.9 mm Hg) compared with controls (P<.001 for both systolic BP and diastolic BP). Controlling for publication bias and methodological study quality, when yoga was practiced 3 sessions per week among samples with hypertension, yoga interventions that included breathing techniques and meditation/mental relaxation elicited BP reductions of 11/6 mm Hg compared with those that did not (ie, 6/3 mm Hg). Conclusion: Our results indicate that yoga is a viable antihypertensive lifestyle therapy that produces the greatest BP benefits when breathing techniques and meditation/mental relaxation are included.
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Agarwal R, Maroko-Afek A	2018	Yoga into cancer care: a review of the evidence-based research	International Journal of Yoga	Apr;11(1)	3-29	10.4103/ijoy.IJOY_42_17	To cope with cancer and its treatment-related side effects and toxicities, people are increasingly using complementary and alternative medicine (CAM). Consequently, integrative oncology, which combines conventional therapies and evidence-based CAM practices, is an emerging discipline in cancer care. The use of yoga as a CAM is proving to be beneficial and increasingly gaining popularity. An electronic database search (PubMed), through December 15, 2016, revealed 138 relevant clinical trials (single-armed, nonrandomized, and randomized controlled trials) on the use of yoga in cancer patients. A total of 10,660 cancer patients from 20 countries were recruited in these studies. Regardless of some methodological deficiencies, most of the studies reported that yoga improved the physical and psychological symptoms, quality of life, and markers of immunity of the patients, providing a strong support for yoga's integration into conventional cancer care. This review article presents the published clinical research on the prevalence of yoga's use in cancer patients so that oncologists, researchers, and the patients are aware of the evidence supporting the use of this relatively safe modality in cancer care.
Artchoudane S, Ranganadin P, Bhavanani AB, Ramanatha	2018	Effect of adjuvant yoga therapy on pulmonary function and quality of life among patients with chronic obstructive pulmonary disease:	Journal of Basic, Clinical and Applied Health Science	2 (3)	117 - 122	10.5005/jp-journals-10082-01135	Background and Objectives: Previous studies have suggested that yoga positively impacts lung function and quality of life (QoL). The present prospective two-arm, single-blinded and controlled study evaluated the effect of adjuvant yoga therapy on pulmonary function and QoL in patients of Chronic Obstructive Pulmonary Disease (COPD).Material and Methods: Seventy two COPD patients were recruited and randomized to yoga group who received adjuvant yoga therapy in addition to standard

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n M, Madanmoh an T		a randomized control trial					medical management and control group who received only medical management. Yoga therapy protocol included loosening exercises, postures, breathing techniques and relaxation. Forced vital capacity (FVC), forced expiratory volume in first second (FEV1) and FEV1/FVC were measured using computerized pulmonary function test 'Trueflow (nidd)'. Saint George Respiratory Questionnaire (SGRQ) was used to assess QoL. Changes in parameters were correlated with symptoms, activity, impacts and quality scores. Intra-group comparisons were done using Student's paired 't' test and intergroup comparisons using unpaired 't' test. Results: There was significant improvement (p < 0.001) in FVC and FEV1 after four weeks of adjuvant yoga therapy while controls showed decline in all parameters. QoL scores, namely: symptoms, activity, impacts and quality improved significantly in yoga group with no significant changes in controls. Significant correlation was found between pulmonary function and QoL in Yoga group. Conclusion: Significant improvements of lung function with adjuvant yoga therapy can be attributed to comprehensive yoga therapy package administered to participants resulting in decreased airway resistance and better lung compliance attributed to nonspecific broncho-protective / broncho-relaxing effect. Significant improvement in QoL scores can be attributed to improved vital capacity as well as enhanced self-confidence /self-reliance. We conclude that there is a positive and additive role of adjuvant therapy with standard medical management of COPD.
Falkenberg R, Eising C, Peters ML	2018	Yoga and immune system functioning: a systematic review of randomized controlled trials	J Behav Med	Feb;41(4)	467-482	10.1007/ s10865- 018- 9914-y	Yoga is an ancient mind-body practice that is increasingly recognized to have health benefits in a variety of clinical and non-clinical conditions. This systematic review summarizes the findings of randomized controlled trials examining the effects of yoga on immune system functioning which is imperative to justify its application in the clinic. Fifteen RCTs were eligible for the review. Even though the existing evidence is not entirely consistent, a general pattern emerged suggesting that yoga can downregulate pro-inflammatory markers. In particular, the qualitative evaluation of RCTs revealed decreases in IL-1beta, as well as indications for reductions in IL-6 and TNF-alpha. These results imply that yoga may be implemented as a complementary intervention for populations at risk or already suffering from diseases with an inflammatory component. Beyond this, yoga practice may exert further beneficial effects by enhancing cell-mediated and mucosal immunity. It is hypothesized that longer time spans of yoga practice are required to achieve consistent effects especially on circulating inflammatory

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							markers. Overall, this field of investigation is still young, hence the current body of evidence is small and for most immune parameters, more research is required to draw distinct conclusions.
Koulouris A, Dorado K, McDonnel C, Edwards RR, Lazaridou A	2018	A review of the efficacy of yoga and meditation-based interventions for rheumatoid arthritis	OBM Integrative and Complementary Medicine	3(3)	71-86	10.21926/obm.icm.1803018	Background: This paper presents a review of the evidence regarding the efficacy and impact of Yoga and mindfulness with meditation among patients with rheumatoid arthritis (RA). Patients who suffer from RA express a variety of symptoms that negatively impact their physical functioning and performance in social roles. Yoga and meditation-based therapies have been previously used to manage chronic pain conditions and other persisting disorders in affected populations. The suitability and effectiveness of these practices in RA should be thoroughly reviewed and assessed to suggest a successful implementation. Methods: Systematic search of highly recognized medical and alternative therapy databases was conducted. Relevant research papers were screened and selected for review based on a strict set of criteria developed by the authors. Results: Thirteen articles were included in the review: nine randomized controlled trials and four single-arm trials. All studies revealed promising outcomes for the effectiveness of meditation-based interventions in RA. Improvements were identified in pain symptoms, joint inflammation, fatigue, disease activity, and numerous psychological parameters. The lack of standardized research procedures made conclusions across studies challenging to compare. Conclusions: Yoga and mindfulness with meditation might benefit patients who suffer from chronic physical and psychological RA symptoms. Future research assessing the effects of long-term practice is needed to determine the suitability of Yoga and meditation-based therapies in RA.
Livingston, E, Collette-Merrill K	2018	Effectiveness of integrative restoration (iRest)yoga nidra on mindfulness, sleep, and pain in health care workers	Holistic Nursing Practice	Jun;32 (3)	160 - 166	10.1097/HNP.0000000000000266	Objective: Investigate the effectiveness of Integrative Restoration (iRest) Yoga Nidra meditation on mindfulness, sleep, and pain in health care workers. Design: A pre-/postintervention descriptive survey design was used. Before and after experiencing iRest meditation, participants completed a 51-item questionnaire consisting of demographics plus 3 validated instruments: The Five-Facet Mindfulness Questionnaire (FFMQ), the Epworth Sleepiness Scale (ESS), and Department of Defense/Veterans Administration (DoD/VA) Pain Supplemental Questions (PSQ). Participants: A total of 15 participants completed both questionnaires. Results: Postintervention FFMQ scores were significantly higher than preintervention ($z = -3.294, P = .001$). This study showed significant improvement in mindfulness (related to reduction in stress) of

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							health care workers following a guided 8-week iRest Yoga Nidra program. There, was a not a significant difference in the mean ESS scores at baseline and follow-up. However, there was a strong negative correlation between the mean ESS improvement score and the number of weeks attended (rs = -0.705, P = .003). There was not a significant difference in the mean pain baseline and follow-up scores.
Nyer M, Nauphal M, Roberg R, Streeter C	2018	Applications of yoga in psychiatry: what we know - a review	Focus	16 (1)	Pp. 12-18	10.1176/appi.focus.20170055	In the West, while yoga was initially practiced as a form of physical exercise, it is now being studied as a treatment for a variety of mental disorders. A large-scale survey (N=31,044) showed that yoga was already self-reportedly commonly used to treat mental health conditions and musculoskeletal conditions; most subjects reported that yoga helped these symptoms. Of the major psychiatric disorders, depression has a compelling literature supporting the use of yoga as a treatment, even though there are limitations in the current literature base. In a study investigating the impact of a yoga intervention for PTSD in a group of 80 members (9 men, 71 women; median participant age=41 years), the yoga group showed significantly greater improvement in scores for PTSD, insomnia, perceived stress, positive and negative affect, resilience, stress, and anxiety in comparison with the waitlist control group. There is mounting evidence that yoga is helpful for a variety of conditions and symptoms that are directly or indirectly related to mental health concerns (i.e., depression and anxiety) and there are no clear contraindications for the use of yoga as an adjunctive treatment.
Punita P, Trakroo M, Palamalai SR, Subramanian SK, Bhavanani AB, Madhavan C	2018	Randomized controlled trial of 12-week yoga therapy as lifestyle intervention in patients of essential hypertension and cardiac autonomic function tests	National Journal of Physiology, Pharmacy and Pharmacology	Aug;6 (1)	19 - 26	10.5455/njppp.2015.5.2408201572	Background: In the Indian subcontinent, 118 million people have hypertension, and this figure is anticipated to double by 2025. Yoga has been widely claimed to play a role in the prevention and management of psychosomatic, stress-induced, and lifestyle disorders such as hypertension. Aims and Objective: To study the effect of 12 weeks of yoga therapy as a lifestyle intervention on cardiac autonomic functions in patients of essential hypertension. Materials and Methods: Subjects with hypertension from the Medicine Outpatient Department of the Jawaharlal Institute of Postgraduate Medical Education and Research were randomized into control and yoga groups. The control group was treated only with the allopathic medicines. The yoga group was given 12 weeks of yoga therapy module designed by JIPMER Institute Advanced Center for Yoga Therapy Education and Research along with the routine medical treatment. The participants' blood pressure and cardiac autonomic function were recorded before and after the 12 weeks of the

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							study period. Result: No significant change was observed in the body weight (BW), body mass index (BMI), abdominal circumference, and waist-hip ratio (WHR) in both the control and yoga groups at the end of the 12 week-study period. There was a significant decrease in the resting systolic pressure (SP), diastolic pressure (DP), rate pressure product (RPP), and mean arterial pressure (MAP) in the yoga group. In contrast, there was no significant change in the SP, DP, RPP, and MAP of the control group. High frequency (HF) power, total spectral power, and HF normalized units (nu) showed a significant increase in the yoga group. Low frequency (LF) power, HF power, and LF (nu) showed a significant ($p < 0.05$) decrease in the yoga group at the end of the 12-week yoga therapy. Conclusion: Twelve weeks of yoga therapy reduced both the SP and DP in the yoga group. Furthermore, yoga therapy increased the heart rate variability and vagal tone and decreased the sympathetic tone in the subjects with hypertension. At the same time, it increased both the parasympathetic and sympathetic reactivity.
Schmid AA	2018	Yoga improves occupational performance, pain-related disability, and activities of daily living for people with chronic pain	American Journal of Occupational Therapy	72 (7211515238)	7211515238	10.5014/ajot.2018.72S1-RP203D	We examined the impact of an 8-week yoga intervention on occupational performance, pain-related disability, and activities of daily living for people with chronic pain. All outcome measure scores significantly improved for participants randomized to the yoga intervention.
Sharma VM, Manjunath NK, Nagendra HR, Ertsey C	2018	Combination of Ayurveda and yoga therapy reduces pain intensity and improves quality of life in patients with migraine headache	Complementary Therapies in Clinical Practice	32	85-91	10.1016/j.ctcp.2018.05.010	Objectives: To Understand the efficacy of Ayurveda and Yoga in the management of Migraine Headache. Methods: 30 subjects recruited to Ayurveda and Yoga (AY) group underwent traditional <i>Panchakarma</i> (Bio-purificatory process) using therapeutic Purgation followed by Yoga therapy, while 30 subjects of Control (CT) group continued on symptomatic treatment (NSAID's) for 90 days. Body constitution questionnaire was administered to both groups. The outcome measures included Symptom check list, Comprehensive Headache related Quality of Life Questionnaire and Visual Analogue Scale. Results: Forty-six (76.6%) out of 60 subjects belonging to both groups had <i>Pitta</i> based body constitution. Following 90 days of intervention the AY group showed significant reduction in Migraine symptoms including pain intensity ($p < .001$) and improvement in Headache related Quality of Life ($p < .001$). The CT group showed no significant change ($p > .05$).

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							Conclusion: Traditional Ayurveda along with Yoga therapy reduces symptoms, intensity of pain and improves Quality of life in Migraine patients.
Shrivastava N, Maheswari BK, Rath D, Sarkar D	2018	Effects of yoga in modifying blood pressure in patients of type 2 diabetes mellitus	International Journal of Research in Medical Sciences	6(9)	3080-3083	10.18203/2320-6012.ijrms20183648	Background: The incidence of diabetes mellitus is increasing with the increase in unhealthy dietary habits, physical inactivity and sedentary lifestyle. Hypertension complicated with diabetes further aggravates the problem. Yoga has been found to be helpful in delaying the progression and complications of the disease. The present study was undertaken with an aim to evaluate the effect of yoga in modifying blood pressure in patients of diabetes mellitus. Methods: Thirty patients of diabetes mellitus who were known case of hypertension were taken and their fasting and post-prandial blood glucose levels, systolic and diastolic blood pressure and waist circumference were analysed before and after ninety days of yoga in the department of physiology and biochemistry. Results: Systolic and diastolic blood pressure, waist circumference and fasting and post-prandial blood glucose level showed significant reduction (p value <0.05). Conclusions: This study emphasizes the importance of yoga in the control and management of type 2 diabetes mellitus and hypertension.
Zou L, Yeung A, Li C, Wei G, Chen KW, Kinser PA, Chan JSM, Ren Z	2018	Effects of meditative movements on major depressive disorder: a systematic review and meta-analysis of randomized controlled trials	Journal of Clinical Medicine	7(8)	195	10.3390/jcm7080195	Background: Tai Chi, Qigong, and Yoga are recognized as the most popular complementary approaches for alleviating musculoskeletal pain, improving sleep quality, and reducing blood pressure. The therapeutic effects of these meditative movements for treating major depressive disorder (MDD) is yet to be determined. Therefore, we examined whether meditative movements (Tai Chi, Qigong, and Yoga) are effective for treating MDD. Seven electronic databases (SPORT Discus, PubMed, Psyc INFO, Cochrane Library, Web of Science, CNKI, and Wanfang) were used to search relevant articles. Randomized controlled trials (RCT) using Tai Chi, Qigong or Yoga as intervention for MDD were considered for the meta-analysis (standardized mean difference: <i>SMD</i>). Results: Meta-analysis on 15 fair-to-high quality RCTs showed a significant benefit in favor of meditative movement on depression severity (<i>SMD</i> = -0.56, 95% CI -0.76 to -0.37, <i>p</i> < 0.001, <i>I</i> ² = 35.76%) and on anxiety severity (<i>SMD</i> = -0.46, 95% CI -0.71 to -0.21, <i>p</i> < 0.001, <i>I</i> ² = 1.17%). Meditative movement interventions showed significantly improved treatment remission rate (OR = 6.7, 95% CI 2.38 to 18.86, <i>p</i> < 0.001) and response rate (OR = 5.2, 95% CI 1.73 to 15.59, <i>p</i> < 0.001) over passive controls.

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							Conclusions: Emphasizing the therapeutic effects of meditative movements for treating MDD is critical because it may provide a useful alternative to existing mainstream treatments (drug therapy and psychotherapy) for MDD. Given the fact that meditative movements are safe and easily accessible, clinicians may consider recommending meditative movements for symptomatic management in this population.
2017							
BernardiNF ,Bordino M, Bianchi L, Bernardi L	2017	Acute fall and long-term rise in oxygen saturation in response to meditation	Psychophysiology	Dec;54(12)	1951-1966	10.1111/psyp.12972	The effects of meditation on arterial and tissue oxygenation are unknown and difficult to assess because respiration is often altered, directly or indirectly, during meditation practice. Thus, changes in respiration may affect cardiovascular responses independently from meditation. In this study, we aim to isolate the specific effect of meditation on arterial and tissue oxygenation and other cardiorespiratory indexes while systematically controlling for the role of respiration. Furthermore, we aim to clarify to what extent prior expertise in meditation practice is needed to observe reliable changes. Eighty participants, half with and half without prior meditation experience, were tested while pacing breathing at predetermined rates, in the presence or absence of mantra meditation instructions, and in a body scan meditation that did not involve controlled breathing. Continuous recordings were acquired for arterial and brain oxygenation, respiratory excursion, electrocardiogram, skin vasomotion, and blood pressure. In both groups, meditation acutely decreased arterial and cerebral oxygen saturation, reduced chemoreflex sensitivity, and prolonged the RR interval, independently of respiration. Conversely, slow breathing improved heart rate variability, independently of concurrent meditation. In addition to the immediate effects of meditation, the individuals with long-term practice of meditation had overall higher arterial and cerebral oxygen saturation, overall lower blood pressure, and slower baseline respiration. Meditation acutely lowers arterial and tissue oxygenation. A repeated exposure to this condition may lead to long-term adaptation and, through increased ventilatory efficiency and improved gas exchanges, to an increase in baseline oxygenation. Meditation induces favorable changes in cardiovascular and respiratory end points of clinical interest.
Bridges L, Sharma M	2017	The efficacy of yoga as a form of treatment for depression	J Evidence-Based Complementary and Alternative Medicine	Oct;22(4)	1017-1028	10.1177/2156587217715927	The purpose of this article was to systematically review yoga interventions aimed at improving depressive symptoms. A total of 23 interventions published between 2011 and May 2016 were evaluated in this review. Three study designs were used: randomized control trials,

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							quasi-experimental, and pre-test/post-test, with majority being randomized control trials. Most of the studies were in the United States. Various yoga schools were used, with the most common being Hatha yoga. The number of participants participating in the studies ranged from 14 to 136, implying that most studies had a small sample. The duration of the intervention period varied greatly, with the majority being 6 weeks or longer. Limitations of the interventions involved the small sample sizes used by the majority of the studies, most studies examining the short-term effect of yoga for depression, and the non-utilization of behavioral theories. Despite the limitations, it can be concluded that the yoga interventions were effective in reducing depression.
Danhauer SC, Addington EL, Sohl SJ, Chaoul A, Cohen L	2017	Review of yoga therapy during cancer treatment	Supportive Care in Cancer	25(4)	1357–1372	10.1007/s00520-016-3556-9	<p>Purpose: Reviews of yoga research that distinguish results of trials conducted <i>during</i> (versus after) cancer treatment are needed to guide future research and clinical practice. We therefore conducted a review of non-randomized studies and randomized controlled trials of yoga interventions for children and adults undergoing treatment for any cancer type. Methods: Studies were identified via research databases and reference lists. Inclusion criteria were the following: (1) children or adults undergoing cancer treatment, (2) intervention stated as yoga or component of yoga, and (3) publication in English in peer-reviewed journals through October 2015. Exclusion criteria were the following: (1) samples receiving hormone therapy only, (2) interventions involving meditation only, and (3) yoga delivered within broader cancer recovery or mindfulness-based stress reduction programs. Results: Results of non-randomized (adult $n = 8$, pediatric $n = 4$) and randomized controlled trials (adult $n = 13$, pediatric $n = 0$) conducted during cancer treatment are summarized separately by age group. Findings most consistently support improvement in psychological outcomes (e.g., depression, distress, anxiety). Several studies also found that yoga enhanced quality of life, though further investigation is needed to clarify domain-specific efficacy (e.g., physical, social, cancer-specific). Regarding physical and biomedical outcomes, evidence increasingly suggests that yoga ameliorates sleep and fatigue; additional research is needed to advance preliminary findings for other treatment sequelae and stress/immunity biomarkers. Conclusions: Among adults undergoing cancer treatment, evidence supports recommending yoga for improving psychological outcomes, with potential for also improving physical symptoms. Evidence is insufficient to evaluate the efficacy of yoga in pediatric oncology. We</p>

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							describe suggestions for strengthening yoga research methodology to inform clinical practice guidelines.
Groessler E, Liu L, Chang D, Atkinson JH, Baxi S, Schmalzl L	2017	Yoga for military veterans with low back pain – a randomized clinical trial	American Journal of Preventative Medicine	Nov;53(5)	599-608	10.1016/j.amepre.2017.05.019	<p>Introduction: Chronic low back pain (cLBP) is prevalent, especially among military veterans. Many cLBP treatment options have limited benefits and are accompanied by side effects. Major efforts to reduce opioid use and embrace nonpharmacological pain treatments have resulted. Research with community cLBP patients indicates that yoga can improve health outcomes and has few side effects. The benefits of yoga among military veterans were examined. Design: Participants were randomized to either yoga or delayed yoga treatment in 2013–2015. Outcomes were assessed at baseline, 6 weeks, 12 weeks, and 6 months. Intention-to-treat analyses occurred in 2016. Setting/Participants: One hundred and fifty military veterans with cLBP were recruited from a major Veterans Affairs Medical Center in California. Intervention: Yoga classes (with home practice) were led by a certified instructor twice weekly for 12 weeks, and consisted primarily of physical postures, movement, and breathing techniques. Main outcome measures: The primary outcome was Roland–Morris Disability Questionnaire scores after 12 weeks. Pain intensity was identified as an important secondary outcome. Results: Participant characteristics were mean age 53 years, 26% were female, 35% were unemployed or disabled, and mean back pain duration was 15 years. Improvements in Roland–Morris Disability Questionnaire scores did not differ between the two groups at 12 weeks, but yoga participants had greater reductions in Roland–Morris Disability Questionnaire scores than delayed treatment participants at 6 months -2.48 (95% CI $= -4.08, -0.87$). Yoga participants improved more on pain intensity at 12 weeks and at 6 months. Opioid medication use declined among all participants, but group differences were not found. Conclusions: Yoga improved health outcomes among veterans despite evidence they had fewer resources, worse health, and more challenges attending yoga sessions than community samples studied previously. The magnitude of pain intensity decline was small but occurred in the context of reduced opioid use. The findings support wider implementation of yoga programs for veterans.</p>
Stephens I	2017	Medical yoga therapy	Children (Basel)	4(2)	12	10.3390/children4020012	<p>Medical yoga is defined as the use of yoga practices for the prevention and treatment of medical conditions. Beyond the physical elements of yoga, which are important and effective for strengthening the body, medical yoga also incorporates appropriate breathing techniques,</p>

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							mindfulness, and meditation in order to achieve the maximum benefits. Multiple studies have shown that yoga can positively impact the body in many ways, including helping to regulate blood glucose levels, improve musculoskeletal ailments and keeping the cardiovascular system in tune. It also has been shown to have important psychological benefits, as the practice of yoga can help to increase mental energy and positive feelings, and decrease negative feelings of aggressiveness, depression and anxiety
Tolahunase M, Sagar R, Dada R	2017	Impact of yoga and meditation on cellular aging in apparently healthy individuals: a prospective, open-label single-arm exploratory study	Oxidative Medicine and Cellular Longevity	Article ID 792898 1	9p	10.1155/2017/7928981	Objective: This study was designed to explore the impact of Yoga and Meditation based lifestyle intervention (YMLI) on cellular aging in apparently healthy individuals. Methodology: During this 12-week prospective, open-label, single arm exploratory study, 96 apparently healthy individuals were enrolled to receive YMLI. The primary endpoints were assessment of the change in levels of cardinal biomarkers of cellular aging in blood from baseline to week 12, which included DNA damage marker 8-hydroxy-2-deoxyguanosine (8- OH2dG), oxidative stress markers reactive oxygen species (ROS), and total antioxidant capacity (TAC), and telomere attrition markers telomere length and telomerase activity. The secondary endpoints were assessment of metabotropic blood biomarkers associated with cellular aging, which included cortisol, β -endorphin, IL-6, BDNF, and sirtuin-1. After 12 weeks of YMLI, there were significant improvements in both the cardinal biomarkers of cellular aging and the metabotropic biomarkers influencing cellular aging compared to baseline values. Results: The mean levels of 8-OH2dG, ROS, cortisol, and IL-6 were significantly lower and mean levels of TAC, telomerase activity, β -endorphin, BDNF, and sirtuin-1 were significantly increased (all values $p < 0.05$) post-YMLI. The mean level of telomere length was increased but the finding was not significant ($p = 0.069$). YMLI significantly reduced the rate of cellular aging in apparently healthy population.
2016							
Chu P, Gotink RA, Yeh GY, Goldie SJ, Hunink MGM	2016	The effectiveness of yoga in modifying risk factors for cardiovascular disease and metabolic syndrome: A	European Journal of Preventative Cardiology	23 (3)	291-307	10.1177/2047487314562741	Background: Yoga, a popular mind-body practice, may produce changes in cardiovascular disease (CVD) and metabolic syndrome risk factors. Design: This was a systematic review and random-effects meta-analysis of randomized controlled trials (RCTs). Methods: Electronic searches of MEDLINE, EMBASE, CINAHL, PsycINFO, and The Cochrane Central Register of Controlled Trials were performed for systematic reviews and RCTs through December 2013. Studies were included if they were

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		systematic review and meta-analysis of randomized controlled trials					English, peer-reviewed, focused on asana-based yoga in adults, and reported relevant outcomes. Two reviewers independently selected articles and assessed quality using Cochrane's Risk of Bias tool. Results: Out of 1404 records, 37 RCTs were included in the systematic review and 32 in the meta-analysis. Compared to non-exercise controls, yoga showed significant improvement for body mass index (-0.77 kg/m ² (95% confidence interval -1.09 to -0.44)), systolic blood pressure (-5.21 mmHg (-8.01 to -2.42)), low-density lipoprotein cholesterol (-12.14 mg/dl (-21.80 to -2.48)), and high-density lipoprotein cholesterol (3.20 mg/dl (1.86 to 4.54)). Significant changes were seen in body weight (-2.32 kg (-4.33 to -0.37)), diastolic blood pressure (-4.98 mmHg (-7.17 to -2.80)), total cholesterol (-18.48 mg/dl (-29.16 to -7.80)), triglycerides (-25.89 mg/dl (-36.19 to -15.60)), and heart rate (-5.27 beats/min (-9.55 to -1.00)), but not fasting blood glucose (-5.91 mg/dl (-16.32 to 4.50)) nor glycosylated hemoglobin (-0.06% Hb (-0.24 to 0.11)). No significant difference was found between yoga and exercise. One study found an impact on smoking abstinence. Conclusions: There is promising evidence of yoga on improving cardio-metabolic health. Findings are limited by small trial sample sizes, heterogeneity, and moderate quality of RCTs.
Innes KE, Selve TK	2016	Yoga for adults with type 2 diabetes: a systematic review of controlled trials	Journal of Diabetes Research	Article ID 6979370	23p	10.1155/2016/6979370	Methodology: To identify qualifying studies, we searched nine databases and scanned bibliographies of relevant review papers and all identified articles. Controlled trials that did not target adults with diabetes, included only adults with type 1 diabetes, were under two-week duration, or did not include quantitative outcome data were excluded. Study quality was evaluated using the PEDro scale. Thirty-three papers reporting findings from 25 controlled trials (13 nonrandomized, 12 randomized) met our inclusion criteria (N = 2170 participants). Outcome: A growing body of evidence suggests yogic practices may benefit adults with type 2 diabetes (DM2). Collectively, findings suggest that yogic practices may promote significant improvements in several indices of importance in DM2 management, including glycemic control, lipid levels, and body composition. More limited data suggest that yoga may also lower oxidative stress and blood pressure; enhance pulmonary and autonomic function, mood, sleep, and quality of life; and reduce medication use in adults with DM2. However, given the methodological limitations of existing studies, additional high-quality investigations are required to confirm and further elucidate the potential benefits of yoga programs in populations with DM2.

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Khalsa S, Cohen L, McCall T, Telles S	2016	Principles and practice of yoga in health care	Handspring Publishing (Paperback book or Digital Kindle version available)		538p.		Contains comprehensive reviews of the literature on the applications of Yoga for: Mental Health; Musculoskeletal and neurological conditions, Endocrine conditions, Cardiorespiratory conditions, Cancer and Yoga for various health professions. Reviews include very useful summary of literature/trials on each topic, in tabular forms.
Mubarak G, Rajasekhar P, Vastard BC	2016	Effect of sukha pranayama and bhastrika pranayama on cardiovascular autonomic functions among young healthy individuals	Journal of Evidence Based Medical Healthcare	3(40)	1968-1971	10.18410/jebmh/2016/438	Background: Practice of Yoga causes several changes in normal physiology. Meditation has positive short and long-term rewards which include a balance of the parasympathetic and sympathetic functions. Cardiovascular autonomic functions are quantified by changes in the heart rate (HR) and blood pressure (BP) in response to some of the physiological stimuli and different types of Pranayamas is known to alter the autonomic function. Objectives: To assess the effects of Sukha Pranayama and Bhastrika Pranayama on cardiovascular autonomic functions in normal healthy medical students. Materials and methods:50 male and female young healthy volunteers studying at PES Institute of Medical Sciences and Research, Kuppam belonging to age group of 17-22 years were included for the study. Parasympathetic activity was assessed by observing the heart rate changes to immediate standing from lying down position, heart rate changes during deep breathing and heart rate changes during Valsalva manoeuvre using Biopac Student Lab MP30 device. Sympathetic activity was assessed by observing blood pressure changes on immediate standing from lying down position and blood pressure changes during sustained hand grip using sphygmomanometer before and after yoga. Results & conclusion: The baseline heart rate and blood pressure response to immediate standing showed a tendency to decrease possibly due to increased vagal tone and decreased sympathetic discharge thereby indicating practice of yogasanas and pranayamas would benefit the young population as it would prepare them in overcoming stress by modulating and optimising sympathetic activities in stressful situations.
Ni M, Signorile JF, Mooney K, Balachandran A, Potiaumpai M, Luca C,	2016	Comparative effect of power training and high-speed yoga on motor function in older patients with Parkinson disease	Archives of Physical Medicine and Rehabilitation	Mar;97(3)	345-354	10.1016/j.apmr.2015.10.095	Objectives: To compare the effects of power training (PWT) and a high-speed yoga program on physical performances in older patients with Parkinson disease (PD), and to test the hypothesis that both training interventions would attenuate PD symptoms and improve physical performance. Design: Randomized controlled trial. Setting: A laboratory of neuromuscular research and active aging. Participants: Patients with PD (N=41; mean age \pm SD, 72.2 \pm 6.5y). Interventions: Two high-speed exercise interventions (specifically designed yoga program and PWT)

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Moore JG, Kuenze CM, Eltoukhy M, Perry AC							were given for 12 weeks (twice a week), and 1 non-exercise control group. Main outcome measures: Unified Parkinson Disease Rating Scale motor score (UPDRSMS), Berg Balance Scale (BBS), Mini-Balance Evaluation Systems Test (Mini-BESTest), Timed Up and Go, functional reach, single leg stance (SLS), postural sway test, 10-m usual and maximal walking speed tests, 1 repetition maximum (RM), and peak power (PPW) for leg press. Results: For the posttests, both training groups showed significant improvements ($P < .05$) in all physical measurements except functional reach on the more affected side, SLS, and postural sway compared with the pretests, and significantly better scores for UPDRSMS, BBS, Mini-BESTest, Timed Up and Go, functional reach on the less affected side, 10-m usual and maximal walking speed tests, 1RM, and PPW than controls, with no differences detected between the yoga program and PWT. Conclusions: Both the specially designed yoga program and PWT programs can significantly improve physical performance in older persons with PD.
Ni M, Mooney K, Signorile JF	2016	Controlled pilot study of the effects of power yoga in Parkinson's disease	Complementary Therapies in Medicine	Apr;25	126-31	10.1016/j.ctim.2016.01.007	Objectives: To evaluate the effects of a specially designed power yoga program (YOGA) on bradykinesia, rigidity, muscular performance and quality of life in older patients with PD. Design: Randomized controlled trial. Setting: University laboratory, US. Intervention: Twenty-six patients with mild to moderate PD were randomly assigned to a YOGA or control group (CON). The YOGA program was three months, incorporating two sessions/wk of yoga classes. Main outcome measures: Upper and lower limb bradykinesia and rigidity scores from the Unified Parkinson's Disease Rating Scale, one repetition maximums (1RM) and peak powers on biceps curl, chest press, leg press, hip abduction and seated calf, and quality of life (PDQ-39). Results: The YOGA group produced significant improvement in both upper and lower limbs bradykinesia scores, rigidity score, 1RM for all 5 machines and leg press power ($p < .05$). Significant improvements were seen in the PDQ-39 overall score, mobility and activities of daily living domain for the YOGA group. Conclusion: The 3-month YOGA program significantly reduced bradykinesia and rigidity, and increased muscle strength and power in older patients with PD. Power training is an effective training modality to improve physical function and quality of life for PD.
Sharma M, Lingam VC, Nahar VK	2016	A systematic review of yoga interventions as	Journal of Cancer Research and Clinical Oncology	Seo;142	2523-2540	10.1007/s00432-	Breast cancer is a significant public health problem all over the world. The treatment of breast cancer has many side effects. Yoga has been suggested as an integrative form of therapy for breast cancer. The

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		integrative treatment in breast cancer				016-2269-2	purpose of this study was to systematically review yoga interventions for breast cancer and determine the efficacy of these interventions as integrative modalities of treatment in altering various outcomes related to breast cancer. Methods: Studies were included if (1) exclusively targeted breast cancer patients; (2) published between 2013 and May 2016; (3) written in the English language; (4) published in a peer-reviewed journals indexed in MEDLINE (PubMed), CINAHL, ERIC and Alt Health Watch; (5) they used any type of yoga as a part of or the whole intervention; and (6) utilized a quantitative design for evaluation. Results: A total of 23 interventions met the inclusion criteria. Majority of the studies had been done in USA (n = 9), followed by Germany (n = 3), India (n = 3) and Turkey (n = 2). One study each was from Australia, Canada, Iran, Taiwan, Poland, and UK. Twenty-two of the 23 interventions had statistically significant changes in studied outcome measures. Conclusions: Despite the limitations of wide variabilities in sample size, lack of standardized approach in conducting yoga, multiplicity of outcome measures, varying durations of interventions and lack of using behavioral theories, yoga as an integrative form of therapy for breast cancer is a promising approach. More interventions utilizing yoga need to be tested.
Tyagi A, Cohen M, Reece J, Telles S, Jones L	2016	Heart rate variability, flow, mood and mental stress during yoga practices in yoga practitioners, non-yoga practitioners and people with metabolic syndrome	Applied Psychophysiology and Biofeedback	41(4)	381–393	10.1007/s10484-016-9340-2	Heart Rate Variability (HRV) and respiratory sinus arrhythmia are directly associated with autonomic flexibility, self-regulation and well-being, and inversely associated with physiological stress, psychological stress and pathology. Yoga enhances autonomic activity, mitigates stress and benefits stress-related clinical conditions, yet the relationship between autonomic activity and psychophysiological responses during yoga practices and stressful stimuli has not been widely explored. This experimental study explored the relationship between HRV, mood states and flow experiences in regular yoga practitioners (YP), non-yoga practitioners (NY) and people with metabolic syndrome (MetS), during Mental Arithmetic Stress Test (MAST) and various yoga practices. The study found that the MAST placed a cardio-autonomic burden in all participants with the YP group showing the greatest reactivity and the most rapid recovery, while the MetS group had significantly blunted recovery. The YP group also reported a heightened experience of flow and positive mood states compared to NY and MetS groups as well as having a higher vagal tone during all resting conditions. These results suggest yoga practitioners have a greater homeostatic capacity and autonomic, metabolic and physiological resilience. Further studies are now needed to determine if regular yoga practice may improve

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							autonomic flexibility in non-yoga practitioners and metabolic syndrome patients.
Zu-Yao YangHui-Bin ZhongChen MaoJin-QiuYuanYa fangHuang Xin-Yin WuYuan-Mei GaoJin-Ling Tang	2016	Yoga for asthma	Cochrane Database of Systematic Reviews	2016(4)	Art. No.: CD010346	10.1002/14651858.CD010346.pub2	Background: Asthma is a common chronic inflammatory disorder affecting about 300 million people worldwide. As a holistic therapy, yoga has the potential to relieve both the physical and psychological suffering of people with asthma, and its popularity has expanded globally. A number of clinical trials have been carried out to evaluate the effects of yoga practice, with inconsistent results. Objectives: To assess the effects of yoga in people with asthma. Search methods: We systematically searched the Cochrane Airways Group Register of Trials, which is derived from systematic searches of bibliographic databases including the Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, EMBASE, CINAHL, AMED, and PsycINFO, and handsearching of respiratory journals and meeting abstracts. We also searched PEDro. We searched ClinicalTrials.gov and the WHO ICTRP search portal. We searched all databases from their inception to 22 July 2015 and used no restriction on language of publication. We checked the reference lists of eligible studies and relevant review articles for additional studies. We attempted to contact investigators of eligible studies and experts in the field to learn of other published and unpublished studies. Selection criteria: We included randomised controlled trials (RCTs) that compared yoga with usual care (or no intervention) or sham intervention in people with asthma and reported at least one of the following outcomes: quality of life, asthma symptom score, asthma control, lung function measures, asthma medication usage, and adverse events. Data collection and analysis: We extracted bibliographic information, characteristics of participants, characteristics of interventions and controls, characteristics of methodology, and results for the outcomes of our interest from eligible studies. For continuous outcomes, we used mean difference (MD) with 95% confidence interval (CI) to denote the treatment effects, if the outcomes were measured by the same scale across studies. Alternatively, if the outcomes were measured by different scales across studies, we used standardised mean difference (SMD) with 95% CI. For dichotomous outcomes, we used risk ratio (RR) with 95% CI to measure the treatment effects. We performed meta-analysis with Review Manager 5.3. We used the fixed-effect model to pool the data, unless there was substantial heterogeneity among studies, in which case we used the random-effects model instead. For outcomes inappropriate or impossible to pool quantitatively,

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							<p>we conducted a descriptive analysis and summarised the findings narratively. Main results: We included 15 RCTs with a total of 1048 participants. Most of the trials were conducted in India, followed by Europe and the United States. The majority of participants were adults of both sexes with mild to moderate asthma for six months to more than 23 years. Five studies included yoga breathing alone, while the other studies assessed yoga interventions that included breathing, posture, and meditation. Interventions lasted from two weeks to 54 months, for no more than six months in the majority of studies. The risk of bias was low across all domains in one study and unclear or high in at least one domain for the remainder. There was some evidence that yoga may improve quality of life (MD in Asthma Quality of Life Questionnaire (AQLQ) score per item 0.57 units on a 7-point scale, 95% CI 0.37 to 0.77; 5 studies; 375 participants), improve symptoms (SMD 0.37, 95% CI 0.09 to 0.65; 3 studies; 243 participants), and reduce medication usage (RR 5.35, 95% CI 1.29 to 22.11; 2 studies) in people with asthma. The MD for AQLQ score exceeded the minimal clinically important difference (MCID) of 0.5, but whether the mean changes exceeded the MCID for asthma symptoms is uncertain due to the lack of an established MCID in the severity scores used in the included studies. The effects of yoga on change from baseline forced expiratory volume in one second (MD 0.04 litres, 95% CI -0.10 to 0.19; 7 studies; 340 participants; $I(2) = 68\%$) were not statistically significant. Two studies indicated improved asthma control, but due to very significant heterogeneity ($I(2) = 98\%$) we did not pool data. No serious adverse events associated with yoga were reported, but the data on this outcome was limited. Authors' conclusions: We found moderate-quality evidence that yoga probably leads to small improvements in quality of life and symptoms in people with asthma. There is more uncertainty about potential adverse effects of yoga and its impact on lung function and medication usage. RCTs with a large sample size and high methodological and reporting quality are needed to confirm the effects of yoga for asthma.</p>
2015							
Cramer H, Ward L, Saper R, Fishbein D,	2015	The safety of yoga: a systematic review and meta-analysis	American Journal of Epidemiology	Aug;182 (4)	281-293	10.1093/aje/kwv071	As yoga has gained popularity as a therapeutic intervention, its safety has been questioned in the lay press. Thus, this review aimed to systematically assess and meta-analyze the frequency of adverse events in randomized controlled trials of yoga. MEDLINE/PubMed, Scopus, the Cochrane Library, and IndMED were screened through February 2014.

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Dobos G, Lauche R		of randomized controlled trials					Of 301 identified randomized controlled trials of yoga, 94 (1975–2014; total of 8,430 participants) reported on adverse events. Life-threatening, disabling adverse events or those requiring intensive treatment were defined as serious and all other events as nonserious. No differences in the frequency of intervention-related, nonserious, or serious adverse events and of dropouts due to adverse events were found when comparing yoga with usual care or exercise. Compared with psychological or educational interventions (e.g., health education), more intervention-related adverse events (odds ratio = 4.21, 95% confidence interval: 1.01, 17.67; $P = 0.05$) and more nonserious adverse events (odds ratio = 7.30, 95% confidence interval: 1.91, 27.92; $P < 0.01$) occurred in the yoga group; serious adverse events and dropouts due to adverse events were comparable between groups. Findings from this review indicate that yoga appears as safe as usual care and exercise. The adequate reporting of safety data in future randomized trials of yoga is crucial to conclusively judge its safety.
Innes KE, Selve TK	2015	Yoga for adults with type 2 diabetes: a systematic review of controlled trials	Journal of Diabetes Research	2016	Article ID 6979370	10.1155/2016/6979370	A growing body of evidence suggests yogic practices may benefit adults with type 2 diabetes (DM2). In this systematic review, we evaluate available evidence from prospective controlled trials regarding the effects of yoga-based programs on specific health outcomes pertinent to DM2 management. To identify qualifying studies, we searched nine databases and scanned bibliographies of relevant review papers and all identified articles. Controlled trials that did not target adults with diabetes, included only adults with type 1 diabetes, were under two-week duration, or did not include quantitative outcome data were excluded. Study quality was evaluated using the PEDro scale. Thirty-three papers reporting findings from 25 controlled trials (13 nonrandomized, 12 randomized) met our inclusion criteria (N = 2170 participants). Collectively, findings suggest that yogic practices may promote significant improvements in several indices of importance in DM2 management, including glycemic control, lipid levels, and body composition. More limited data suggest that yoga may also lower oxidative stress and blood pressure; enhance pulmonary and autonomic function, mood, sleep, and quality of life; and reduce medication use in adults with DM2. However, given the methodological limitations of existing studies, additional high-quality investigations are required to confirm and further elucidate the potential benefits of yoga programs in populations with DM2.

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Kavuri V,Raghuram N,Malamud A, Selvan SR	2015	Irritable bowel syndrome: yoga as remedial therapy	J Evidence-Based Complementary and Alternative Medicine	2015	Article ID 398156	10.1155/2015/398156	Irritable bowel syndrome (IBS) is a group of symptoms manifesting as a functional gastrointestinal (GI) disorder in which patients experience abdominal pain, discomfort, and bloating that is often relieved with defecation. IBS is often associated with a host of secondary comorbidities such as anxiety, depression, headaches, and fatigue. In this review, we examined the basic principles of <i>Pancha Kosha</i> (five sheaths of human existence) concept from an Indian scripture <i>Taittiriya Upanishad</i> and the pathophysiology of a disease from the Yoga approach, <i>Yoga Vasistha's Adhi</i> (originated from mind) and <i>Vyadhi</i> (ailment/disease) concept. An analogy between the age old, the most profound concept of <i>Adhi-Vyadhi</i> , and modern scientific stress-induced dysregulation of brain-gut axis, as it relates to IBS that could pave way for impacting IBS, is emphasized. Based on these perspectives, a plausible Yoga module as a remedial therapy is provided to better manage the primary and secondary symptoms of IBS.
Lu YH, Rosner B, Chang G, Fishman LM	2015	Twelve-minute daily yoga regimen reverses osteoporotic bone loss	Topics in Geriatric Rehabilitation	Jun;32(2)	81 -87	10.1097/TGR.000000000000085	Objective: Assess the effectiveness of selected yoga postures in raising bone mineral density (BMD) Methods: Ten-year study of 741 Internet-recruited volunteers comparing pre-yoga BMD changes with post-yoga BMD changes. Outcome Measures: Dual-energy x-ray absorptiometric scans. Optional radiographs of hips and spine and bone quality study (7 Tesla) Results: Bone mineral density improved in spine, hips, and femur of the 227 moderately and fully compliant patients. Monthly gain in BMD was significant in spine (0.0029 g/cm ² , <i>P</i> = .005) and femur (0.00022 g/cm ² , <i>P</i> = .053), but in 1 cohort, although mean gain in hip BMD was 50%, large individual differences raised the confidence interval and the gain was not significant for total hip (0.000357 g/cm ²). No yoga-related serious injuries were imaged or reported. Bone quality appeared qualitatively improved in yoga practitioners. Conclusion: Yoga appears to raise BMD in the spine and the femur safely.
Moonaz SH, Bingham III CO, Wissow L, Bartlett SJ	2015	Yoga in Sedentary Adults with arthritis: effects of a randomized controlled pragmatic trial	The Journal of Rheumatology	Vol. 42, Issue 7	1194-1202	10.3899/jrheum.141129	Objective. To evaluate the effect of Integral-based hatha yoga in sedentary people with arthritis. Methods. There were 75 sedentary adults aged 18+ years with rheumatoid arthritis (RA) or knee osteoarthritis randomly assigned to 8 weeks of yoga (two 60-min classes and 1 home practice/wk) or waitlist. Poses were modified for individual needs. The primary endpoint was physical health [Medical Outcomes Study Short Form-36 (SF-36) physical component summary (PCS)] adjusted for baseline; exploratory adjusted outcomes included fitness, mood, stress,

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							self-efficacy, SF-36 health-related quality of life (HRQOL), and RA disease activity. In everyone completing yoga, we explored longterm effects at 9 months. Results. Participants were mostly female (96%), white (55%), and college-educated (51%), with a mean (SD) age of 52 years (12 yrs). Average disease duration was 9 years and 49% had RA. At 8 weeks, yoga was associated with significantly higher PCS (6.5, 95% CI 2.0–10.7), walking capacity (125 m, 95% CI 15–235), positive affect (5.2, 95% CI 1.4–8.9), and lower Center for Epidemiologic Studies Depression Scale (–3.0, 95% CI –4.8 – –1.3). Significant improvements ($p < 0.05$) were evident in SF-36 role physical, pain, general health, vitality, and mental health scales. Balance, grip strength, and flexibility were similar between groups. Twenty-two out of 28 in the waitlist group completed yoga. Among all yoga participants, significant ($p < 0.05$) improvements were observed in mean PCS, flexibility, 6-min walk, and all psychological and most HRQOL domains at 8 weeks with most still evident 9 months later. Of 7 adverse events, none were associated with yoga. Conclusion. Preliminary evidence suggests yoga may help sedentary individuals with arthritis safely increase physical activity, and improve physical and psychological health and HRQOL.
Pan Y, Yang K, Wang Y, Zhang L, Liang H	2015	Could yoga practice improve treatment-related side effects and quality of life for women with breast cancer? A systematic review and meta-analysis	Asia-Pacific Journal of Clinical Oncology	Apr;13(2)	79-95	10.1111/ajco.12329	Aim: To determine if yoga as a complementary and alternative therapy was associated with enhanced health and treatment-related side effects in patients with breast cancer. This systematic review examines whether yoga practice provides any measurable benefit, both physically and psychologically, for women with breast cancer. Methods: PubMed, EMBASE and the Cochrane Library for randomized controlled trials (RCTs) throughout June 2013. We evaluated the quality of the included studies by the Cochrane Handbook 5.2 standards and analyzed the data using the Stata software, version 10.0. Meta-regression and subgroup analysis were also performed to identify additional predictors of outcome and to assess heterogeneity. Results: Sixteen RCTs with a total of 930 participants were included. Comparing yoga groups to control groups, there was a statistically significant difference in overall health-related quality of life, depression, anxiety and gastrointestinal symptoms. Meta-regression analyses revealed that the duration of yoga practice and type of control group partly explained the heterogeneity. Subgroup analyses revealed that yoga had a positive effect on anxiety only when it had been practiced for longer than 3 months. Only the wait-list control group showed an effect of yoga on physical well-being. Conclusion: The current evidence demonstrates that yoga practice could be effective in

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							enhancing health and managing some treatment-related side effects for patients recovering from breast cancer. In future clinical studies, clinicians should consider the patient's wishes along with the current best evidence of the effects of yoga practice in their clinical decision-making.
Pascoe MC, Bauer IE	2015	A systematic review of randomised control trials on the effects of yoga on stress measures and mood	Journal of Psychiatric Research	Sep;68	270 - 282	10.1016/j.jpsychires.2015.07.013	Stress related disorders such as depression and anxiety are leading sources of disability worldwide, and current treatment methods such as conventional antidepressant medications are not beneficial for all individuals. There is evidence that yoga has mood-enhancing properties possibly related to its inhibitory effects on physiological stress and inflammation, which are frequently associated with affective disorders. However, the biological mechanisms via which yoga exerts its therapeutic mood-modulating effects are largely unknown. This systematic review investigates the effects of yoga on sympathetic nervous system and hypothalamic pituitary adrenal axis regulation measures. It focuses on studies collecting physiological parameters such as blood pressure, heart rate, cortisol, peripheral cytokine expression and/or structural and functional brain measures in regions involved in stress and mood regulation. Overall the 25 randomised control studies discussed provide preliminary evidence to suggest that yoga practice leads to better regulation of the sympathetic nervous system and hypothalamic-pituitary-adrenal system, as well as a decrease in depressive and anxious symptoms in a range of populations. Further research is warranted to confirm these preliminary findings and facilitate implementation in clinical settings.
Sheffield K, Woods-Giscombe CL	2015	Efficacy, feasibility, and acceptability of perinatal yoga on women's mental health and well-being: a systematic literature review	Journal of Holistic Nursing	34(1)	64-79	10.1177/0898010115577976	Introduction: Perinatal major depressive disorder affects 20% of women, while perinatal anxiety affects 10% of women. Although pharmacological treatment has shown effectiveness, many pregnant women are concerned about potential adverse effects on the fetus, maternal-infant bonding, and child development. Approximately 38% of American adults use complementary and alternative medicine, including yoga and other mind-body strategies. Although complementary and alternative medicine has been less studied in the perinatal population, it potentially offers women and their providers alternatives to traditional medication for treatment of perinatal depression and anxiety. Thus, the purpose of this systematic review was to examine existing empirical literature on yoga and its effects on women's health and well-being during the perinatal period. Method: Following PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines for systemic

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							literature reviews, literature searches using relevant search terms were performed in four major electronic databases: CINAHL, PubMed, PsycINFO, and EMBASE. Thirteen publications met inclusion criteria. Results: Results indicated that yoga interventions are generally effective in reducing anxiety and depression in pregnant women. Discussion: The use of yoga in the perinatal period shows promise in improving mental health and well-being for women and infants. This review can inform future yoga intervention studies and clinical practice with the perinatal population.
Yadav RK, Sarvottam K, Magan D, Yadav R	2015	A two-year follow-up case of chronic fatigue syndrome: substantial improvement in personality following a yoga-based lifestyle intervention	Journal of Alternative and Complementary Medicine, New York	21(4)	246-9	10.1089/acm.2014.0055	Background and Objective: Chronic Fatigue Syndrome (CFS) is characterized by excessive fatigue after minimal physical or mental exertion, muscle and joint pain, poor concentration, dizziness, and sleep disturbances. We report here the effect of a yoga-based lifestyle intervention in a 30-year old male patient with a documented diagnosis of CFS with compromised quality of life (QoL) and altered personality. Methods: The patient initially attended a short-term yoga-based lifestyle intervention program that consisted of yoga-postures, breathing exercises (pranayama), meditation, group discussions, and individualized advice on stress management, diet and physical activity besides group support. Thereafter, patient attended 5 more such programs. Results: There was a notable and consistent improvement in his clinical profile, positive aspects of personality and subjective well-being, and reduction in anxiety following this yoga-based lifestyle intervention. Conclusion: Overall, the results suggest that lifestyle intervention may improve clinical condition and personality in patients with CFS.
2014							
Chandwani KD, Perkins G, Nagendra HR, Raghuram NV, Nagarathna R, Arun B, Morris GS, Scheetz J,	2014	Randomized, controlled trial of yoga in women with breast cancer undergoing radiotherapy	J Clin Oncol 32:1058-1065	Apr;32(10)	1058-1065	10.1200/JCO.2012.48.2752	Purpose Previous research incorporating yoga (YG) into radiotherapy (XRT) for women with breast cancer finds improved quality of life (QOL). However, shortcomings in this research limit the findings. Patients and Methods: Patients with stages 0 to III breast cancer were recruited before starting XRT and were randomly assigned to YG (n 53) or stretching (ST; n 56) three times a week for 6 weeks during XRT or waitlist (WL; n 54) control. Self-report measures of QOL (Medical Outcomes: Study 36-item short-form survey; primary outcomes), fatigue, depression, and sleep quality, and five saliva samples per day for 3 consecutive days were collected at baseline, end of treatment, and 1, 3, and 6 months later. Results: The YG group had significantly greater increases in physical component scale scores compared with the WL group at 1 and 3 months

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Chaoul A, Cohen L							after XRT (P .01 and P .01). At 1, 3, and 6 months, the YG group had greater increases in physical functioning compared with both ST and WL groups (P .05), with ST and WL differences at only 3 months (P .02). The group differences were similar for general health reports. By the end of XRT, the YG and ST groups also had a reduction in fatigue (P .05). There were no group differences for mental health and sleep quality. Cortisol slope was steepest for the YG group compared with the ST and WL groups at the end (P .023 and P .008) and 1 month after XRT (P .05 and P .04). Conclusion YG improved QOL and physiological changes associated with XRT beyond the benefits of simple ST exercises, and these benefits appear to have long-term durability.
Cramer H, Lauche R, Haller H, Steckhan N, Michalsen A, Dobos G	2014	Effects of yoga on cardiovascular disease risk factors: a systematic review and meta-analysis.	International Journal of Cardiology	May 1;173(2)	170-83	10.1016/j.ijcard.2014.02.017	Background: The aim of this review was to systematically assess and meta-analyze the effects of yoga on modifiable biological cardiovascular disease risk factors in the general population and in high-risk disease groups. Methods: MEDLINE/PubMed, Scopus, the Cochrane Library, and IndMED were screened through August 2013 for randomized controlled trials (RCTs) on yoga for predefined cardiovascular risk factors in healthy participants, non-diabetic participants with high risk for cardiovascular disease, or participants with type 2 diabetes mellitus. Risk of bias was assessed using the Cochrane risk of bias tool. Results: Forty-four RCTs with a total of 3168 participants were included. Risk of bias was high or unclear for most RCTs. Relative to usual care or no intervention, yoga improved systolic (mean difference (MD)=-5.85 mm Hg; 95% confidence interval (CI)=-8.81, -2.89) and diastolic blood pressure (MD=-4.12 mm Hg; 95%CI=-6.55, -1.69), heart rate (MD=-6.59 bpm; 95%CI=-12.89, -0.28), respiratory rate (MD=-0.93 breaths/min; 95%CI=-1.70, -0.15), waist circumference (MD=-1.95 cm; 95%CI=-3.01, -0.89), waist/hip ratio (MD=-0.02; 95%CI=-0.03, -0.00), total cholesterol (MD=-13.09 mg/dl; 95%CI=-19.60, -6.59), HDL (MD=2.94 mg/dl; 95%CI=0.57, 5.31), VLDL (MD=-5.70 mg/dl; 95%CI=-7.36, -4.03), triglycerides (MD=-20.97 mg/dl; 95%CI=-28.61, -13.32), HbA1c (MD=-0.45%; 95%CI=-0.87, -0.02), and insulin resistance (MD=-0.19; 95%CI=-0.30, -0.08). Relative to exercise, yoga improved HDL (MD=3.70 mg/dl; 95%CI=1.14, 6.26). Conclusions: This meta-analysis revealed evidence for clinically important effects of yoga on most biological cardiovascular disease risk factors. Despite methodological drawbacks of the included studies, yoga can be considered as an ancillary intervention for the general population and for patients with increased risk of cardiovascular disease.

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Corey SM, Epel E, Schembri M, Pawlowsky SB, Cole RJ, Araneta MRG, Barrett-Connor E, Kanaya AM	2014	Effect of restorative yoga vs. stretching on diurnal cortisol dynamics and psychosocial outcomes in individuals with the metabolic syndrome: The PRYSMS randomized controlled trial	Psychoneuroendocrinology Science Direct	Nov;49	260-271	10.1016/j.psyneuen.2014.07.012	<p>Purpose: Chronic stimulation and dysregulation of the neuroendocrine system by stress may cause metabolic abnormalities. We estimated how much cortisol and psychosocial outcomes improved with a restorative yoga (relaxation) versus a low impact stretching intervention for individuals with the metabolic syndrome. Methods: We conducted a 1-year multi-center randomized controlled trial (6-month intervention and 6-month maintenance phase) of restorative yoga vs. stretching. Participants completed surveys to assess depression, social support, positive affect, and stress at baseline, 6 months and 12 months. For each assessment, we collected saliva at four points daily for three days and collected response to dexamethasone on the fourth day for analysis of diurnal cortisol dynamics. We analyzed our data using multivariate regression models, controlling for study site, medications (antidepressants, hormone therapy), body mass index, and baseline cortisol values.</p> <p>Results: Psychosocial outcome measures were available for 171 study participants at baseline, 140 at 6 months, and 132 at 1 year. Complete cortisol data were available for 136 of 171 study participants (72 in restorative yoga and 64 in stretching) and were only available at baseline and 6 months. At 6 months, the stretching group had decreased cortisol at waking and bedtime compared to the restorative yoga group. The pattern of changes in stress mirrored this improvement, with the stretching group showing reductions in chronic stress severity and perseverative thoughts about their stress. Perceived stress decreased by 1.5 points (-0.4; 3.3, $p = 0.11$) at 6 months, and by 2.0 points (0.1; 3.9, $p = 0.04$) at 1 year in the stretching compared to restorative yoga groups. Post hoc analyses suggest that in the stretching group only, perceived increases in social support (particularly feelings of belonging), but not changes in stress were related to improved cortisol dynamics.</p> <p>Conclusions: We found significant decreases in salivary cortisol, chronic stress severity, and stress perception in the stretching group compared to the restorative yoga group. Group support during the interactive stretch classes may have contributed to these changes.</p>
Cramer H, Lauche R, Haller H, Steckhan N,	2014	Effects of yoga on cardiovascular disease risk factors: A systematic review and meta-analysis	International Journal of Cardiology	173(2)	P170-183	10.1016/j.ijcard.2014.02.017	<p>Background: The aim of this review was to systematically assess and meta-analyze the effects of yoga on modifiable biological cardiovascular disease risk factors in the general population and in high-risk disease groups. Methods: MEDLINE/PubMed, Scopus, the Cochrane Library, and IndMED were screened through August 2013 for randomized controlled trials (RCTs) on yoga for predefined cardiovascular risk factors</p>

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Michalsen A, Dobos G							in healthy participants, non-diabetic participants with high risk for cardiovascular disease, or participants with type 2 diabetes mellitus. Risk of bias was assessed using the Cochrane risk of bias tool. Results: Forty-four RCTs with a total of 3168 participants were included. Risk of bias was high or unclear for most RCTs. Relative to usual care or no intervention, yoga improved systolic (mean difference (MD) = - 5.85 mm Hg; 95% confidence interval (CI) = - 8.81, - 2.89) and diastolic blood pressure (MD = - 4.12 mm Hg; 95%CI = - 6.55, - 1.69), heart rate (MD = - 6.59 bpm; 95%CI = - 12.89, - 0.28), respiratory rate (MD = - 0.93 breaths/min; 95%CI = - 1.70, - 0.15), waist circumference (MD = - 1.95 cm; 95%CI = - 3.01, - 0.89), waist/hip ratio (MD = - 0.02; 95%CI = - 0.03, - 0.00), total cholesterol (MD = - 13.09 mg/dl; 95%CI = - 19.60, - 6.59), HDL (MD = 2.94 mg/dl; 95%CI = 0.57, 5.31), VLDL (MD = - 5.70 mg/dl; 95%CI = - 7.36, - 4.03), triglycerides (MD = - 20.97 mg/dl; 95%CI = - 28.61, - 13.32), HbA1c (MD = - 0.45%; 95%CI = - 0.87, - 0.02), and insulin resistance (MD = - 0.19; 95%CI = - 0.30, - 0.08). Relative to exercise, yoga improved HDL (MD = 3.70 mg/dl; 95%CI = 1.14, 6.26). Conclusions: This meta-analysis revealed evidence for clinically important effects of yoga on most biological cardiovascular disease risk factors. Despite methodological drawbacks of the included studies, yoga can be considered as an ancillary intervention for the general population and for patients with increased risk of cardiovascular disease.
Raghuram N, Parachuri VR, Swarnagowri MV, Babu S, Chakur R, Kulkarni R, Bhuyan B, Bhargava H, Nagendra HR	2014	Yoga based cardiac rehabilitation after coronary artery bypass surgery: One-year results on LVEF, lipid profile and psychological states e A randomized controlled study	Indian Heart Journal	Sep;66(5)	490-502		Objective: To compare the long-term effects of yoga based cardiac rehabilitation program with only physiotherapy-based program as an add-on to conventional rehabilitation after coronary artery bypass grafting (CABG) on risk factors. Methods: In this single blind prospective randomized parallel two-armed active control study, 1026 patients posted for CABG at Narayana Hrudayalaya Institute of Cardiac Sciences, Bengaluru (India) were screened. Of these, 250 male participants (35e65 years) who satisfied the selection criteria and consented were randomized into two groups. Within and between group comparisons were done at three points of follow up (i.e. 6th week, 6th month, and 12th month) by using Wilcoxon's signed ranks test and Mann Whitney U test respectively. Results: Yoga group had significantly (p ¼ 0.001, Mann Whitney) better improvement in LVEF than control group in those with abnormal baseline EF (<53%) after 1 year. There was a better reduction in BMI in the yoga group (p ¼ 0.038, between groups) in those with high baseline BMI (23) after 12 months. Yoga group showed significant (p ¼ 0.008, Wilcoxon's) reduction in blood glucose at one year in those with

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							high baseline FBS 110 mg/dl. There was significantly better improvement in yoga than the control group in HDL (p ¼ 0.003), LDL (p ¼ 0.01) and VLDL (p ¼ 0.03) in those with abnormal baseline values. There was significantly better improvement (p ¼ 0.02, between groups) in positive affect in yoga group. Within Yoga group, there was significant decrease in perceived stress (p ¼ 0.001), anxiety (p ¼ 0.001), depression (p ¼ 0.001), and negative affect (p ¼ 0.03) while in the control group there was reduction (p ¼ 0.003) only in scores on anxiety. Conclusion: Addition of yoga based relaxation to conventional post-CABG cardiac rehabilitation helps in better management of risk factors in those with abnormal baseline values and may help in preventing recurrence.
van der Kolk BA, Stone L, West J, Rhodes A, Emerson D, Suvak M, Spinazzola J	2014	Yoga as an adjunctive treatment for posttraumatic stress disorder: a randomized controlled trial	Journal of Clinical Psychiatry	Jun;75(6)	559-565	10.4088/JCP.13m08561	Background: More than a third of the approximately 10 million women with histories of interpersonal violence in the United States develop posttraumatic stress disorder (PTSD). Currently available treatments for this population have a high rate of incomplete response, in part because problems in affect and impulse regulation are major obstacles to resolving PTSD. This study explored the efficacy of yoga to increase affect tolerance and to decrease PTSD symptomatology. Method: Sixty-four women with chronic, treatment-resistant PTSD were randomly assigned to either trauma-informed yoga or supportive women's health education, each as a weekly 1-hour class for 10 weeks. Assessments were conducted at pre-treatment, mid-treatment, and post-treatment and included measures of DSM-IV PTSD, affect regulation, and depression. The study ran from 2008 through 2011. Results: The primary outcome measure was the Clinician-Administered PTSD Scale (CAPS). At the end of the study, 16 of 31 participants (52%) in the yoga group no longer met criteria for PTSD compared to 6 of 29 (21%) in the control group (n = 60, $\chi^2_1 = 6.17$, P = .013). Both groups exhibited significant decreases on the CAPS, with the decrease falling in the large effect size range for the yoga group (d = 1.07) and the medium to large effect size decrease for the control group (d = 0.66). Both the yoga (b = -9.21, t = -2.34, P = .02, d = -0.37) and control (b = -22.12, t = -3.39, P = .001, d = -0.54) groups exhibited significant decreases from pre-treatment to the mid-treatment assessment. However, a significant group x quadratic trend interaction (d = -0.34) showed that the pattern of change in Davidson Trauma Scale significantly differed across groups. The yoga group exhibited a significant medium effect size linear (d = -0.52) trend. In contrast, the control group exhibited only a significant medium effect size quadratic

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							trend (d = 0.46) but did not exhibit a significant linear trend (d = -0.29). Thus, both groups exhibited significant decreases in PTSD symptoms during the first half of treatment, but these improvements were maintained in the yoga group, while the control group relapsed after its initial improvement. Discussion: Yoga significantly reduced PTSD symptomatology, with effect sizes comparable to well-researched psychotherapeutic and psychopharmacologic approaches. Yoga may improve the functioning of traumatized individuals by helping them to tolerate physical and sensory experiences associated with fear and helplessness and to increase emotional awareness and affect tolerance.
2013							
Balasubramaniam M, Telles S, Doraiswamy PM	2013	Yoga on our minds: a systematic review of yoga for neuropsychiatric disorders	Frontiers in Psychiatry	Jan 25;3	117	10.3389/fpsy.2012.00117	Background: The demand for clinically efficacious, safe, patient acceptable, and cost-effective forms of treatment for mental illness is growing. Several studies have demonstrated benefit from yoga in specific psychiatric symptoms and a general sense of well-being. Objective: To systematically examine the evidence for efficacy of yoga in the treatment of selected major psychiatric disorders. Methods: Electronic searches of The Cochrane Central Register of Controlled Trials and the standard bibliographic databases, MEDLINE, EMBASE, and PsycINFO, were performed through April 2011 and an updated in June 2011 using the keywords yoga AND psychiatry OR depression OR anxiety OR schizophrenia OR cognition OR memory OR attention AND randomized controlled trial (RCT). Studies with yoga as the independent variable and one of the above-mentioned terms as the dependent variable were included and exclusion criteria were applied. Results: The search yielded a total of 124 trials, of which 16 met rigorous criteria for the final review. Grade B evidence supporting a potential acute benefit for yoga exists in depression (four RCTs), as an adjunct to pharmacotherapy in schizophrenia (three RCTs), in children with ADHD (two RCTs), and Grade C evidence in sleep complaints (three RCTs). RCTs in cognitive disorders and eating disorders yielded conflicting results. No studies looked at primary prevention, relapse prevention, or comparative effectiveness versus pharmacotherapy. Conclusion: There is emerging evidence from randomized trials to support popular beliefs about yoga for depression, sleep disorders, and as an augmentation therapy. Limitations of literature include inability to do double-blind studies, multiplicity of comparisons within small studies, and lack of replication. Biomarker and neuroimaging studies, those comparing yoga with

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							standard pharmaco- and psychotherapies, and studies of long-term efficacy are needed to fully translate the promise of yoga for enhancing mental health.
Bartlett SJ, Haaz S, Mill C, Bernatsky S, Bingham III CO	2013	Yoga in Rheumatic Diseases	Current Rheumatology Reports	15(387)		10.1007/s11926-013-0387-2	Yoga is a popular activity which may be well suited for some individuals with certain rheumatic disorders. Regular yoga practice can increase muscle strength and endurance, proprioception and balance, with emphasis on movement through a full range of motion to increase flexibility and mobility. Additional beneficial elements of yoga include breathing, relaxation, body awareness and meditation, which can reduce stress and anxiety and promote a sense of calmness, general well-being and improved quality of life. Yoga also encourages a meditative focus, increased body awareness and mindfulness; some evidence suggests yoga may help decrease inflammatory mediators including C-reactive protein and interleukin-6. Yoga is best learned under the supervision of qualified teachers who are well informed about the potential musculoskeletal needs of each individual. Here, we briefly review the literature on yoga in healthy, musculoskeletal, and rheumatic disease populations and offer recommendations for discussing ways to begin yoga with patients.
Eastman-Mueller H, Wilson T, Jung AK, Kimura A, Tarrant J	2013	iRestyoga-nidra on the college campus: changes in stress, depression, worry, and mindfulness	International Journal of Yoga Therapy	23(2)	15-24	10.17761/ijyt.23.2.r8735770101m8277	Objectives: There is evidence that yoga practice is associated with decreased stress, worry, and depression, and with improved mindfulness-based skills. These findings had not been previously replicated for a sample of college students. This study evaluated whether iRest yoga-nidra practice was associated with reduced perceived stress, worry, and depression, and increased mind fulness in a sample of college students. Methods: Sixty-six students age 18–56 completed an 8-week iRest yoga-nidra intervention that was offered for 8 semesters. Assessment occurred 1 week prior to intervention onset and during the class period following the intervention. Qualitative data were collected at Weeks 4 and 8. Results: Statistically significant pre- to post-test improvements in perceived stress, worry, and depression were found. Pre-existing depression accounted for most of the change in worry and perceived stress scores. Pre- to post-test improvements in mindfulness-based skills were also detected. Conclusions: iRest yoga-nidra practice may reduce symptoms of perceived stress, worry, and depression and increase mindfulness-based skills.

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2012							
Chen KW, Berger CC, Manheimer E, Forde D, Magidson J, Dachman L, Lejuez CW	2012	Meditative therapies for reducing anxiety: a systematic review and meta-analysis of randomized controlled trials	Depression and Anxiety, ADAA	29 (7)	545-562	10.1002/da.21964	Background: Anxiety disorders are among the most common psychiatric disorders and meditative therapies are frequently sought by patients with anxiety as a complementary therapy. Although multiple reviews exist on the general health benefits of meditation, no review has focused on the efficacy of meditation for anxiety specifically. Methods: Major medical databases were searched thoroughly with keywords related to various types of meditation and anxiety. Over 1,000 abstracts were screened, and 200+ full articles were reviewed. Only randomized controlled trials (RCTs) were included. The Boutron (Boutron et al., 2005: J Clin Epidemiol 58:1233–1240) checklist to evaluate a report of a nonpharmaceutical trial (CLEAR-NPT) was used to assess study quality; 90% of the authors were contacted for additional information. Review Manager 5 was used for meta-analysis. Results: A total of 36 RCTs were included in the meta-analysis (2,466 observations). Most RCTs were conducted among patients with anxiety as a secondary concern. The study quality ranged from 0.3 to 1.0 on the 0.0–1.0 scale (mean = 0.72). Standardized mean difference (SMD) was –0.52 in comparison with waiting-list control (p < .001; 25 RCTs), –0.59 in comparison with attention control (p < .001; seven RCTs), and –0.27 in comparison with alternative treatments (p < .01; 10 RCTs). Twenty-five studies reported statistically superior outcomes in the meditation group compared to control. No adverse effects were reported.
Gaëlle Desbordes, Lobsang T. Negi, and Eric L. Schwartz	2012	Effects of mindful-attention and compassion meditation training on amygdala response to emotional stimuli in an ordinary, non-meditative state	Frontiers in Human Neuroscience	6	292	10.3389/fnhum.2012.00292	The amygdala has been repeatedly implicated in emotional processing of both positive and negative-valence stimuli. Previous studies suggest that the amygdala response to emotional stimuli is lower when the subject is in a meditative state of mindful-attention, both in beginner meditators after an 8-week meditation intervention and in expert meditators. However, the longitudinal effects of meditation training on amygdala responses have not been reported when participants are in an ordinary, non-meditative state. In this study, we investigated how 8 weeks of training in meditation affects amygdala responses to emotional stimuli in subjects when in a non-meditative state. Healthy adults with no prior meditation experience took part in 8 weeks of either Mindful Attention Training (MAT), Cognitively Based Compassion Training (CBCT; a program based on Tibetan Buddhist compassion meditation practices), or an active control intervention. Before and after the intervention, participants underwent an fMRI experiment during which they were

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							presented images with positive, negative, and neutral emotional valences from the IAPS database while remaining in an ordinary, non-meditative state. Using a region-of-interest analysis, we found a longitudinal decrease in right amygdala activation in the Mindful Attention group in response to positive images, and in response to images of all valences overall. In the CBCT group, we found a trend increase in right amygdala response to negative images, which was significantly correlated with a decrease in depression score. No effects or trends were observed in the control group. This finding suggests that the effects of meditation training on emotional processing might transfer to non-meditative states. This is consistent with the hypothesis that meditation training may induce learning that is not stimulus- or task-specific, but process-specific, and thereby may result in enduring changes in mental function.
Markil N, Whitehurst M, Jacobs PL, Zoeller RF	2012	Yoga Nidra Relaxation Increases Heart Rate Variability and is Unaffected by a Prior Bout of Hatha Yoga	J. Alternative and Complementary Medicine	Oct;18(10)		10.1089/acm.2011.0331	Objective: The measurement of heart rate variability (HRV) is often applied as an index of autonomic nervous system (ANS) balance and, therefore, myocardial stability. Previous studies have suggested that relaxation or mind–body exercise can influence ANS balance positively as measured by HRV but may act via different mechanisms. No studies, to the authors' knowledge, have examined the acute response in HRV to interventions combining relaxation and mind–body exercise. The objective of this study was to compare the acute HRV responses to Yoga Nidra relaxation alone versus Yoga Nidra relaxation preceded by Hatha yoga. Design: This was a randomized counter-balanced trial. Setting: The trial was conducted in a university exercise physiology laboratory. Subjects: Subjects included 20 women and men (29.15±6.98 years of age, with a range of 18–47 years). Interventions: Participants completed a yoga plus relaxation (YR) session and a relaxation only (R) session. Results: The YR condition produced significant changes from baseline in heart rate (HR; beats per minute [bpm], $p<0.001$) and indices of HRV: R–R (ms, $p<0.001$), pNN50 (% , $p=0.009$), low frequency (LF; %, $p=0.008$) and high frequency (HF; %, $p=0.035$). The R condition produced significant changes from baseline in heart rate (bpm, $p<0.001$) as well as indices of HRV: R–R (ms, $p<0.001$), HF (ms ² , $p=0.004$), LF (% , $p=0.005$), HF (% , $p=0.008$) and LF:HF ratio (% , $p=0.008$). There were no significant differences between conditions at baseline nor for the changes from baseline for any of the variables. Conclusions: These changes demonstrate a favorable shift in autonomic balance to the parasympathetic branch of the ANS for both conditions, and that Yoga

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							Nidra relaxation produces favorable changes in measures of HRV whether alone or preceded by a bout of Hatha yoga.
Pre-2012							
Ebnezar J, Nagarathna R, Bali Y, Nagendra HR	2011	Effect of an integrated approach of yoga therapy on quality of life in osteoarthritis of the knee joint: A randomized control study	International Journal of Yoga	Jul;4(2)	55-63	10.4103/0973-6131.85486	Aim: This study was designed to evaluate the efficacy of addition of integrated yoga therapy to therapeutic exercises in osteoarthritis (OA) of knee joints. Materials and Methods: This was a prospective randomized active control trial. A total of t participants with OA of knee joints between 35 and 80 years (yoga, 59.56 ± 9.54 and control, 59.42 ± 10.66) from the outpatient department of Dr. John's Orthopedic Center, Bengaluru, were randomly assigned to receive yoga or physiotherapy exercises after transcutaneous electrical stimulation and ultrasound treatment of the affected knee joints. Both groups practiced supervised intervention (40 min per day) for 2 weeks (6 days per week) with follow up for 3 months. The module of integrated yoga consisted of sithili karana vyayama (loosening and strengthening), asanas, relaxation techniques, pranayama, meditation and didactic lectures on yama, niyama, jnana yoga, bhakti yoga, and karma yoga for a healthy lifestyle change. The control group also had supervised physiotherapy exercises. A total of 118 (yoga) and 117 (control) were available for final analysis. Results: Significant differences were observed within (P < 0.001, Wilcoxon's) and between groups (P < 0.001, Mann-Whitney U-test) on all domains of the Short Form-36 (P < 0.004), with better results in the yoga group than in the control group, both at 15(th) day and 90(th) day. Conclusion: An integrated approach of yoga therapy is better than therapeutic exercises as an adjunct to transcutaneous electrical stimulation and ultrasound treatment in improving knee disability and quality of life in patients with OA knees.
Chris C. Streeter, MD, Theodore H. Whitfield, ScD, Liz Owen, BArch, Tasha Rein, BA,	2010	Effects of yoga versus walking on mood, anxiety, and brain GABA levels: a randomized controlled MRS study	The Journal of Alternative and Complementary Medicine	Volume 16, Number 11, 2010	1145–1152	10.1089/acm.2010.0007	Objectives: Yoga and exercise have beneficial effects on mood and anxiety. g-Aminobutyric acid (GABA)-ergic activity is reduced in mood and anxiety disorders. The practice of yoga postures is associated with increased brain GABA levels. This study addresses the question of whether changes in mood, anxiety, and GABA levels are specific to yoga or related to physical activity. Methods: Healthy subjects with no significant medical/psychiatric disorders were randomized to yoga or a metabolically matched walking intervention for 60 minutes 3 times a week for 12 weeks. Mood and anxiety scales were taken at weeks 0, 4, 8, 12, and before each magnetic resonance spectroscopy scan. Scan 1 was at baseline. Scan 2, obtained after the 12-week intervention, was

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Surya K. Karri, MD, MPH, Aleksandra Yakhkind, MS, Ruth Perlmutter, MA, Andrew Prescott, PhD, Perry F. Renshaw, MD, PhD, Domenic A. Ciraulo, MD, ¹ and J. Eric Jensen, PhD							followed by a 60-minute yoga or walking intervention, which was immediately followed by Scan 3. Results: The yoga subjects (n ¼ 19) reported greater improvement in mood and greater decreases in anxiety than the walking group (n ¼ 15). There were positive correlations between improved mood and decreased anxiety and thalamic GABA levels. The yoga group had positive correlations between changes in mood scales and changes in GABA levels. Conclusions: The 12-week yoga intervention was associated with greater improvements in mood and anxiety than a metabolically matched walking exercise. This is the first study to demonstrate that increased thalamic GABA levels are associated with improved mood and decreased anxiety. It is also the first time that a behavioral intervention (i.e., yoga postures) has been associated with a positive correlation between acute increases in thalamic GABA levels and improvements in mood and anxiety scales. Given that pharmacologic agents that increase the activity of the GABA system are prescribed to improve mood and decrease anxiety, the reported correlations are in the expected direction. The possible role of GABA in mediating the beneficial effects of yoga on mood and anxiety warrants further study
Innes KE, Bourguignon C, Taylor AG	2005	Risk indices associated with the insulin resistance syndrome, cardiovascular disease, and possible protection with yoga: a systematic review	Journal of the American Board of Family Medicine	Nov-Dec;18(6)	491-519	10.3122/jabfm.18.6.491	Objective: To conduct a systematic review of published literature regarding the effects of yoga, a promising mind-body therapy, on specific anthropometric and physiologic indices of cardiovascular disease (CVD) risk and on related clinical endpoints. Methods: We performed a literature search using 4 computerized English and Indian scientific databases. The search was restricted to original studies (1970 to 2004) evaluating the effects of yoga on CVD or indices of CVD risk associated with the insulin resistance syndrome (IRS). Randomized controlled trials (RCTs), nonrandomized controlled trials, uncontrolled (pre and post) clinical trials, and cross-sectional (observational) studies were included if they met specific criteria. Data were extracted regarding study design, setting, population size and characteristics, intervention type and duration, comparison group or condition, outcome assessment, data analysis and presentation, follow-up, and key results, and the quality of each study was evaluated according to specific predetermined criteria. Results: We identified 70 eligible studies, including 1 observational study, 26 uncontrolled clinical trials, 21 nonrandomized controlled clinical trials, and 22 RCTs. Together, the reported results of these studies indicate beneficial changes overall in several IRS-related indices of CVD risk,

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							including glucose tolerance and insulin sensitivity, lipid profiles, anthropometric characteristics, blood pressure, oxidative stress, coagulation profiles, sympathetic activation, and cardiovagal function, as well as improvement in several clinical endpoints. Conclusions: Collectively, these studies suggest that yoga may reduce many IRS-related risk factors for CVD, may improve clinical outcomes, and may aid in the management of CVD and other IRS-related conditions. However, the methodologic and other limitations characterizing most of these studies preclude drawing firm conclusions. Additional high quality RCTs are needed to confirm and further elucidate the effects of standardized yoga programs on specific indices of CVD risk and related clinical endpoints.
Miller J, Fletcher K, Kabat Zinn J	1995	Three-year follow-up and clinical implications of a mindfulness meditation-based stress reduction intervention in the treatment of anxiety disorders	General Hospital Psychiatry	17 (3)	192-200	10.1016/0163-8343(95)00025-M	A previous study of 22 medical patients with DSM-III-R-defined anxiety disorders showed clinically and statistically significant improvements in subjective and objective symptoms of anxiety and panic following an 8-week outpatient physician-referred group stress reduction intervention based on mindfulness meditation. Twenty subjects demonstrated significant reductions in Hamilton and Beck Anxiety and Depression scores postintervention and at 3-month follow-up. In this study, 3-year follow-up data were obtained and analyzed on 18 of the original 22 subjects to probe long-term effects. Repeated measures analysis showed maintenance of the gains obtained in the original study on the Hamilton [$F(2,32) = 13.22; p < 0.001$] and Beck [$F(2,32) = 9.83; p < 0.001$] anxiety scales as well as on their respective depression scales, on the Hamilton panic score, the number and severity of panic attacks, and on the Mobility Index-Accompanied and the Fear Survey. A 3-year follow-up comparison of this cohort with a larger group of subjects from the intervention who had met criteria for screening for the original study suggests generalizability of the results obtained with the smaller, more intensively studied cohort. Ongoing compliance with the meditation practice was also demonstrated in the majority of subjects at 3 years. We conclude that an intensive but time-limited group stress reduction intervention based on mindfulness meditation can have long-term beneficial effects in the treatment of people diagnosed with anxiety disorders.