

# An Overview of Yoga Research for Health and Well-Being

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Yoga is part of mainstream culture today, with major medical centers, community healthcare centers, and neighborhood yoga studios offering yoga as a mind-body practice to support health and healing. In the U.S., over 20 million individuals now practice yoga, with studios found in nearly every state. Although yoga has existed in various forms for around 2,500 years, the phenomenon of “yoga for health” is a characteristic of more modern yoga [1].

While scientific research on the health effects of yoga postures has been conducted and published for many years this line of scientific inquiry has grown tremendously only in the last 10 to 20 years, especially in terms of more rigorous randomized, controlled trials (RCT) [2,3] A search on the US National Library of Medicine’s biomedical database PubMed (<http://www.ncbi.nlm.nih.gov/pubmed/>) now yields approximately 3,150 scientific publications on yoga. In addition to RCTs of the health benefits of yoga, there are many other important avenues of yoga research such as epidemiological research that helps researchers to understand the characteristics of people who practice yoga, methodological and measurement research to improve the quality of yoga research, and qualitative yoga research with narratives that directly carry the voices of those who teach and practice yoga [4–9]. There has also been considerable research done on the more general physical effects of yoga practice [10,11]. With this large upsurge in research documenting the therapeutic effects of yoga, efforts have been underway to understand the mechanisms of these health benefits, including research on inflammation and the autonomic nervous system [12–20].

In addition to yoga research being conducted on adults, there is increasing interest in the benefits of yoga on a more complete span of individuals—including school age children, adolescents, expectant mothers, and the elderly [21–30]. Yoga research is quickly being extended to other populations as well, including people in the workplace, among athletes, and a strong new interest in yoga research among active duty military and veterans with pain conditions, combat stress and Post Traumatic Stress Disorder (PTSD) [31–39].

With the emergence of higher quality yoga research, there is evidence that yoga has sizable and replicable effects for many health conditions. Although health is viewed as holistic in yogic traditions and aspects of health are clearly intertwined, research often targets specific areas such as physical health, mental health, and/or spiritual well-being. Some conditions that have been well studied include depression, stress and anxiety, irritable bowel syndrome, HIV, heart conditions, cancer, and chronic low back pain (CLBP) [40–43]. With CLBP, for example, a recent review documented consistent findings that yoga can improve function and decrease pain in people with CLBP [44,45]. Additionally yoga practice among people with CLBP reduces depression and pain medication use and improves quality of life [46–48].

There have been studies examining the potential benefits of yoga for cancer survivors, with the majority of research focusing on alleviating symptoms of radiation or chemotherapy, such as

fatigue. A recent review concluded that yoga improves quality of life and psychosocial outcomes including depression in cancer survivors, but evidence is limited for supporting improvements in fatigue or sleep [49,50].

Considerable research has also been conducted examining the effects of yoga on cardiovascular risk factors, including a recent review concluding that yoga is a promising method for reducing high blood pressure (hypertension). Other reviews too report a variety of beneficial effects of yoga for cardiovascular diseases more broadly [51]. For asthma, the breathing component of yoga has been linked to improvements in lung function, but has not proven to be better than standard breathing exercises for those specific outcomes [52–54].

While there have been studies conducted on the effects of yoga for other health conditions, these are more pilot and/or small research studies and the results are considered more preliminary at best, or inconclusive. This is not surprising, given it is only recently that adequate research funding has been available to conduct the larger, more rigorous scientific studies.

Clearly, in cases where yoga does not offer significant relief from physical disease, it can still offer some measure of relief from suffering. In this sense, yoga can provide a different way of looking at pain and suffering, which in itself can potentially alleviate some suffering. The basic realization that “I” am not my body, or my thoughts, or my sensations of pain, is itself healing or liberating from a certain kind of existential suffering.

Along these lines, yoga has also been increasingly studied as a treatment or adjunctive treatment for a variety of mental health disorders. Many studies have found that yoga can reduce symptoms of stress or generalized anxiety, schizophrenia, depression, PTSD, and substance use, but these studies vary in size, quality, and methodology [41,42,55–61]. A recent systematic review of 25 randomized control studies examined the effects of yoga on sympathetic nervous system and hypothalamic pituitary adrenal axis regulation measures, as well as structural and functional brain measures in regions involved in stress and mood regulation. The review suggested that yoga practice leads to better regulation of autonomic nervous system and a decrease in depressive and anxious symptoms in a range of populations [62].

A recent report and comprehensive review of evidence and guidelines by the Canadian Agency for Drugs and Technologies in Health (CADTH) analyzed the quality of the evidence for yoga as a treatment for a few specific mental health disorders and provided references to studies and guidelines for each of these mental health areas [63]. To summarize the conclusions of this evidence-review, the report found evidence supporting yoga as a treatment or adjunctive treatment for depression. However, depending the type and severity of depression, yoga may be recommended as a second-line or third-line treatment after medication and psychotherapeutics. In more severe depression where suicide is a major risk, yoga is best viewed as adjunctive to other treatments.

The report found that the methodology and quality of studies on yoga and generalized anxiety disorder (GAD) vary considerably and evidence is considered preliminary. Studies tend to be

small pilot projects and many different measures of stress and/or anxiety were used. At least one randomized pilot study provided preliminary evidence that yoga improved GAD symptoms [55]. Other anxiety disorders were not reviewed but two previous review studies summarize preliminary evidence in other disorders or stress/anxiety symptoms more generally [64,65].

The CADTH report judged the evidence of yoga for treating PTSD as unclear, although there are some promising pilot studies that have found beneficial effects in recent years.[58,59] Most studies have focused on survivors of natural disasters or on women with a history of domestic-abuse or sexual trauma, and only two of over ten studies have focused on military or combat-related trauma, with only the single 2014 study presenting quantitative results [66,67].

Finally, the CADTH review concluded that the studies showing impact of yoga for reducing alcohol or drug use are of low quality. Thus, the benefits of yoga for substance use and addictions are an area that appears promising, but much more research is needed.

In addition to the detailed CADTH review on yoga for specific mental health disorders, the effects of yoga on psychological symptoms is often studied in other diseases where they co-occur or in at-risk populations[38,68–70]. While it is difficult to succinctly summarize this diverse literature, most studies report beneficial effects of yoga on mental health and well-being, but most are smaller pilot studies.

With few exceptions among all of the research that has been conducted, findings indicate that yoga rarely has harmful effects and is well received by participants. There may be certain poses or types of yoga that are not good for certain health conditions, and good research is done in collaboration with clinical experts and certified yoga instructors who can guide the choice of the style of yoga that will produce the most benefit. Like other exercise activity, the risks of injury from improperly performing yoga postures vary depending on how, where, and with whom the yoga is practiced. The initial practice of yoga under the direction of experienced yoga instructors is thus recommended, as is following a program that has been modified specifically for people with the afflicting health condition. For optimal safety, individuals with specific health concerns should consult their physician before starting a yoga program. While there have been media stories alerting people to the dangers of yoga, data from most research studies reveal very few serious adverse events [36]. For example, in RCT studies of adults with CLBP taught by experienced yoga instructors, three serious adverse events were reported among 308 persons and each was related to herniated discs, and at least one of these was found to be unrelated to yoga practice. Disc problems are common in CLBP in the absence of yoga practice, and thus may have occurred just as readily with inactivity or other activity [44,45].

It is important to note that the original purpose of yoga—to increase one’s spiritual well-being or connection with the divine—has typically been a neglected area for researchers. The popularity of yoga as an exercise that is being done in health clubs has probably led to some de-emphasis of spirituality. We have seen a sort of translation of the spiritual system of yoga into a form of practice

acceptable in a secular context, and an integral feature of yoga is that it adapts to each unique historical era and cultural context [71]. While it is true that some people may be more likely to refuse to try yoga if spirituality is emphasized, it may be possible for the spiritual aspects of yoga to be woven in gently as a feature of yoga practice while emphasizing other physical and mental health benefits as described in this article [72]. To this effect, one study found that the reasons for starting versus continuing yoga changes over time, becoming mostly a spiritual reason after a period of regular practice. Many studies report that the practice of yoga enhances one's spiritual well-being [73–80].

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