

GET SMART WITH YOGA

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In the past few decades yoga's popularity has increased exponentially. The ancient mind/body science known for promoting relaxation, flexibility, and strength is common knowledge, but other benefits are now gaining recognition like improved mood, increased cognitive abilities and enhanced lifestyle behaviors. Scientists are reporting outcomes from a myriad of claims pertaining to the system of yoga and as the data has been quietly collected, studied and documented, another question has emerged, "does yoga make you smarter?"

Based on the findings, a consistent adherence to yoga does in fact facilitate smartness. When practicing the prescribed methods of yoga, the internal change of chemical effects result in positive synergistic states of heightened awareness. Characterized by improved cognitive ability, better memory and greater problem solving abilities, these qualities were not only reported, but statistically significant.

Mindfulness

Mindfulness is an integral component in the practice of yoga. Translated as "awareness," it's a faculty that increases baseline clarity and equanimity and develops a certain "pervasive" consciousness or spirituality. Yoga is an effective method in attaining this kind of focused attention and mindfulness is not only fundamental, but it is virtually indispensable. A study by Paul Salmon from the University of Louisville's Department of Psychological and Brain Sciences, reported that a byproduct of mindfulness is reduced disturbances or fluctuations in the nervous system and that over-activation of the sympathetic nervous system is associated with stress. His studies also revealed that yoga's mindfulness practices combined with breath control are effective in reducing anxiety and physiological symptoms particularly when autonomic hyper-arousal occurs in the context of decreased cognitive performance.

While compelling evidence exists that regulation of physical movement is a priority to the health of the nervous system, from an evolutionary standpoint, regulation of emotional function is perhaps more important. In conjunction with mindfulness, yoga therapies tap into the "pre-wiring" that augments the impact on patterns of behavioral reactivity commonly associated with various conditions such as stress and depression. In addition, autonomic motor control cues (such as the breath) serve as a focal point for mindful attention. There are many approaches to practicing mindfulness, but at the core is breath awareness. The practice of paying attention to one's breathing is an indispensable tool for the development of focus and concentration.

Pranayama (Breath Control)

Respiration influences the autonomic nervous system. It reduces adverse responses to stressors or it can exacerbate them. For example, increased respiration is a typical response to excitation or taxing situations. It can lead to anxiety and decreased cerebral and coronary blood flow manifesting as dizziness, poor performance, headaches, chest pain, or cardiac abnormalities. Sleep disturbances are also a result of unregulated breathing responses. On the other hand, skills in controlling respiratory patterns invite relaxation, an increased sense of wellbeing, and stable cerebral and coronary blood flow. Breathing is governed by the autonomic nervous system, but can also be controlled with the mind. Therefore, breath is the link that runs the entire nervous system and almost all of the functions of the body. Pranayama initiates positive chemical responses associated with calmness, focus, and sensitivity of internal feelings. The value of breathing correctly is now moving quickly to the head of conventional medicine as well as in professional sports.

Another principle for regulating the breath is to sense the movement of it from within. This prepares the practitioner to use the breath as a link to engage the mind on synchronizing physical exercise. A skill known as "Flow State."

Asana (Physical Postures)

Positive psychologist Mihaly Csikszentmihalyi has researched the psychology of exercise and the brain. He refers to physical activity synched with the body and mind as *Flow State*. It is very much like the objective of yoga in that it is a cognitive skill set combined with movements that result in an alert, spontaneous, and sharp mind. The “Sun Salutation,” is a specific sequence of yoga postures performed with coordinated breathing in a dynamic form carried out in a conscious graceful flow. It combines forward-bending, (flexion) countered with backward-bending (extension) specifically designed to tone and strengthen every muscle and gland in the body. Philosophically, its name is derived from the analogy of the “sun shining on the earth” so too, the sequence of postures metaphorically shines (energetically) on every part of the body.

Sun Salutations can be done in a limited space and with regular practice, has proven to exercise, rejuvenate, and restore the whole body. Depending on the duration and intensity of repetitions, a regular asana practice is also associated with cardiovascular fitness as well as muscular strength, power, and endurance. One experiment evaluated heart rates for standing yoga postures and found to lower heart rates and higher rates of perceived exertion for the poses as compared to treadmill walking. Large “moments” (not to be mistaken with movements) generated at the hip and knee during five related postures were studied and found to be comparable to movements experienced during running. Additionally, the study also found minimal power absorption and impact forces at these joints. Thus, yoga is a useful cross training alternative to runners sparing stress on the joints or trying to slow deterioration.

Pranayama and mindfulness, especially concerning joint alignment, is essential regarding ease and facility of moving through the postures. When one breath per posture is assigned, the Sun Salutation becomes a vinyasa and is associated with building strength and endurance. In contrast, holding poses as practiced in the Iyengar style of yoga, underlines elements of resistance training because one’s own body weight is used for overloading targeted musculoskeletal systems. In general, poses are modified and paced to increase or reduce weight bearing factors as tolerated. A combination of the two methods is a popular routine for gaining endurance, strength and power, along with positive brain chemistry.

By combining pranayama and asana, the postures are an integral part of meditation instead of just steps leading toward it. The practice of meditation is the primary tool used to regulate *canalata*, the “constant shifting of thoughts from one haphazard thing to another,” to *ekagrata*, the state when thoughts are streamlined in a single thought process.

Meditation

The psychological effects of meditation have been thoroughly documented in extensive clinical trials and several texts are available with references to the benefits of meditation in regards to cognitive health. Among them are works by Salmon (2008), Streeter (2010), Desikachar (1999) and Iyengar (1997), although differing in detail and teaching approaches, the views of these experts converge on several key points. First, mindfulness is an important aspect of an effective meditation practice. Second, the beneficial effects of conscious relaxation depend on careful, deliberate, and persistent practice, emphasizing correct breathing. An awareness of moment-by-moment sensations as they arise in the course of meditation is another skill which enhances attention and calms impulses. (Moving from *canalata* to *ekagrata*) Clinical findings reveal that meditation produces demonstrable effects on the brain and positive changes that can be detected in baseline cerebral function as well.

This activity has been tracked as electrophysiological evidence science calls “delayed reactive cognition.” It’s measured by P300 waves known as an *evoked potential component*, and assesses higher functions of the brain that’s often used in medicine to measure cognitive changes in diabetics.

Relaxation and meditation are similar in that the single thought process method or meditating on an “object” is recruited. Often times the “object” is simply watching the flow of one’s breath. It’s a way of resting the mind by giving “thinking” a light task. That said, paying attention to the breath can be more challenging than it sounds, but well worth it. Meditative techniques elicit relaxation of all the major muscles and induce a parasympathetic response of deeper, slower breathing. Other physiological changes help the practitioner to experience an equivalent of a sleep state by being completely relaxed yet aware. Meditation works specifically on the mind. The breath is used as a center of focus and in this way the mind is encouraged quiet down. The multitude of thoughts, feelings, and internal excitements remain uninhabited while the exercise of selected attention or meditation is taking place. Note that it’s nearly impossible to ask the mind to “be quiet,” so giving it one simple thing to do is part of the training. Meditation is a form of mind conditioning based on the premise that the mind determines the quality of life.

By developing skills of selective attention and awareness it is possible to redirect reactive habituation. This liberating aspect of meditation is conceptualized in various ways, from purely psychological to spiritual. *Shahaja* meditation showed additional improvement in executive functions, such as manipulation of information in the verbal working memory, added improvement in attention span and visual motor speed in patients with depression. Some athletes report that they use meditation to prepare for competitions as it has shown to improve perceptual-motor tasking compared to non-meditators. These techniques would be especially pivotal for use in the military.

Diet

What one uses to fuel the body is another residual effect relating to the positive influences of yoga. Avoiding certain foods to protect the brain, such as high glycemic index foods like candy, package sugar and refined grains that cause unhealthy spikes in the brain’s fuel supply. Hydrogenated fats or partially hydrogenated fats, colloquialized as “dumb fats,” contain elements that slow blood supply to the brain. Meat from domestic animals contains higher levels of saturated fats and artificial additives which also compromise blood flow to the brain. Because of paying particular attention to the body and mind in yoga, diet is an indirect principle yet a key player in cognitive health. Yoga ascribes to Ayurveda for nutritional guidance and complementary curative therapies.

A form of traditional Indian medicine, Ayurveda highlights diet in conjunction with subtle neuro-physiological pathways known as “nadis” or neurological meridians to gauge nutritional needs. An Ayurvedic diet utilizes the mental awareness that comes with meditation and it’s an important part of the dietary program. Meditation assists in keeping the subtle energetic meridians clear and receptive to explore a more refined dietetic awareness.

Preliminary studies of practitioners using the techniques of Ayurveda showed diet and exercise to be more fun (as measured by a subjective feeling of less exertion) when compared to conventional methods. Both heart and respiratory rates were lower along with a more composed nervous system when compared to the usual “fight-or-flight” exercise stress response. The most remarkable finding was the reproduction of alpha brain waves during exercise, indicating a state of inner calm due to synchronized breathing techniques also encouraged in Ayurvedic medicine. Participants were composed and functioning in an efficient, relaxed way during dynamic physical activity. As in nature, the exerciser was doing less and accomplishing more. Now researchers in the field are no longer content with knowing how much an athlete can do; they want to know how effortlessly it can be done.

Cognitive Research in Psychology

Merriam-Webster's Dictionary defines the word *smart* as mentally quick, bright, witty, and clever. Observant, intelligent, brainy, and sharp" are followed by, "creative," and the ability to memorize information. Applying information is another element of smartness further elaborated on by researcher/psychologists Sternberg & Grigorenko in their book, *The Theory of Successful Intelligence: A Capsule Description*. The theory is that intelligence is the use of an integrated set of abilities needed to attain success in life within a sociocultural context. Therefore, a person is successfully intelligent by virtue of recognizing specific strengths and utilizing them in ways to correct or enhance performance. This also includes seeking an education in finding one's unique path to being intelligent. Adapting, shaping, and selecting favorable environments, an intelligent person also changes and manages her inner world and adjusts in order to fit-in.

Sternberg's intelligence theory focuses on three types of intelligence which are sometimes combined to contribute to one's overall smartness:

- Analytical Intelligence. A method of taking mental steps to solve problems.
- Creative Intelligence, whereby the use of experience fosters insight and a creative approach.
- Practical Intelligence is the ability to read and adapt to the contexts of everyday life.

In his book, *Emotional Intelligence*, Daniel Goleman reported that the IQ score, derived from several different standardized tests only accounts for 20% of a person's success in life. Goleman's research on IQ and education indicates a high IQ predicts 10 to 25% of grades in college leaving the other 80% to what he calls emotional intelligence. Emotional intelligence (also called EQ or EI) refers to the ability to perceive, control, and evaluate emotions. Many corporations now have mandatory EQ training for their managers in an effort to improve employee relations and increase productivity.

Goleman identifies two different ways of being smart, intellectually and emotionally. He states that mental life results from the interaction of both functions. This dichotomy approximates the distinction between "head and heart." Rather than ignoring emotions, Goleman suggests bringing intelligence to emotions. Emotional intelligence would involve:

- Motivation to persist in the face of frustration.
- Regulation of moods and the delay gratification.
- Regulation of moods to control distress from limiting the ability to think.
- Empathize and feel hope and acceptance.

Managing emotions like anger and anxiety is also critical to emotional health as it plays a big part in cognitive function.

Psychologist Raymond Cattell first proposed the concepts of *fluid* and *crystallized* intelligence and further developed a theory with John Horn. The Cattell-Horn theory suggests that intelligence is composed of a number of different abilities that interact and work together to produce an overall intelligent individual. Cattell defined fluid intelligence as "the ability to perceive relationships independent of previous instructions concerning those relationships." Fluid intelligence is thinking and reasoning abstractly to solve problems. Independent of learning, experience, and education, fluid intelligence also includes solving a problem like a puzzle or brainstorming strategies. Situations that require crystallized intelligence include facts rooted in experiences. It is a type of intelligence that becomes stronger with age and accumulates with combined knowledge and understanding; some call it wisdom.

The experience of human fulfillment is the subject of more serious scientific research. In recent years, neuroscience and new cognitive inquiry has begun to confirm the discoveries of the earliest yogis and applying them to modern psychological disciplines. Yoga has received more attention in the field of intelligence

as studies continue to measure its benefits. While promoting well being and increasing physiological health, the role of yoga's contemplative elements are leading the way toward greater mental clarity. Based on documented success rates of cognitive and neurological factors, a regular practice of yoga can in fact make you smarter. With low attrition rates, lack of resultant physical injury, and healthy body weight, yoga is also a relatively safe intervention.

Peer reviewed articles are being published by the National Institutes of Health's special section, the *International Journal of Yoga*. (IJOY) With its own growing database of yoga science, the broad spectrum applications on subjects like physical health and psychological therapies that build confidence along with the reduction of stress reactivity are in the forefront quantitative analysis. Newer research is looking at the impact of yoga on neurology.

With the opportunity to learn about one's personal capabilities and limitations in a relaxed, supportive and noncompetitive atmosphere; yoga is the type of environment likely to encourage participation in addition to an ongoing adherence. Ultimately, the acceptance of yoga as a viable intervention in the context of intelligence will depend on clinical outcome research and methodology that permits modern credibility to this age old science.