



Yoga and Heart Rate Variability

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Introduction

Stress is one of the biggest problems in our society and in health care. Stress costs billions of dollars a year in health care—and incalculable costs in terms of human suffering. According to the American Psychological Association, three-quarters of all Americans experience symptoms related to stress in a given month, and half of Americans report lying awake at night due to stress. Workplace stress costs more than \$300 billion each year in health care costs, missed work and stress reduction.¹ Stress contributes to heart disease, hypertension, strokes and other diseases.

When we are stressed, our bodies shift into “fight or flight” mode as the body prepares to confront danger or flee from it. Adrenaline and other hormones flood our bodies, accelerating heart and lung action. We may flush or pale, and begin sweating. Many processes such as digestion slow or cease. None of this is good for our bodies or minds over a prolonged period of time. But stress—while not entirely avoidable—can be managed without resource to prescription medication. Any individual who wants to control stress can do so. Heart rate variability (HRV) is one of the ways stress can be monitored. By understanding HRV and monitoring it regularly, you can control and lower your clients’ stress levels.

Yoga and Stress

Stress poses a problem to everyone because it interrupts the smooth flow of energy through the body. When the body shifts into stress mode, it creates a block, which requires work and time to remove.

You may ask yourself, “How often do my students report problems with stress?” It is more often, than not, clients will blame their bad energy, or pain on stress in their lives.

Belief in Numbers

The patients who come to your office may or may not be confident in the practice of Yoga. While many believe in the efficacy of yoga, there are always the skeptics who say, “Where is the proof?” or “It’s not real exercise.” This is where heart rate variability can teach everyone a lesson.

In the online journal, EmpowHer, Mary Kyle has written an article on heart disease and the positive effects of Yoga. She writes, “Yoga practitioners exhibit an increase in flexibility, strength, and muscle tone,” along with lower stress levels, improvement in blood pressure levels, lung capacity, heart rate, circulation, and respiratory function. Mary uses a 2009 study conducted at the Indian Institute of Technology in Roorkee, India, to show how this all relates to heart rate variability. The study shows that “HRV rates were higher in yoga practitioners even when no cardiac condition was present and had healthier hearts than non-yoga practitioners.”²

In addition to proving the skeptics wrong, your regular patients will find new meaning in their Yoga sessions by adding objective health measurement to their own subjective experience.

By measuring stress levels through HRV values, you can show your clients several things:

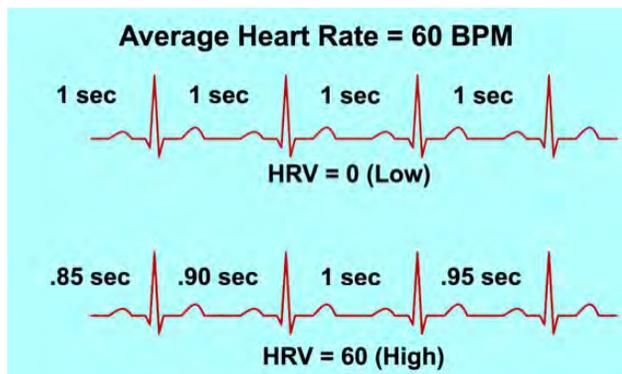
- How well yoga is working for their nervous system
- Which yoga positions effect their bodies the most
- Real time biofeedback *data* based on their sessions

This simple tool will differentiate your classes from other Yoga studios. Take a minute to learn about HRV and our product.

What is Heart Rate Variability?

HRV is the variation in the time interval between one heartbeat and the next. When we think of our heart rate, we generally think of a number between 60 and 90 beats per minute. This number represents an average heart rate. In fact, your heart rate changes from beat to beat. When you inhale your heart rate speeds up and when you exhale it slows down. So rather than referring to a fixed pulse of say, 60 beats per minute, the heart rate will actually vary between, say, 55 and 65 beats per minute. HRV is a measure of this naturally occurring irregularity in the heart rate.

Figure 1. Heart rate variability is the variation between heartbeats.



Source: SweetWater Health, LLC

HRV has been researched as a factor in heart health, stress, athletic training, emotional health, and fitness, to name just a few areas.

Nearly a quarter-century of clinical research has shown that when HRV is high, a person experiences low levels of stress and greater resiliency. When HRV is low, this is an indication of greater stress and lower resiliency.

The National Institutes of Health (NIH) have funded many studies on HRV, using HRV as a biomarker for disease or health. The NIH Clinical Center offers HRV monitoring to show patients how various stresses are affecting their bodies, and provide them with a biofeedback tool to help reduce stress by raising their HRV.

NIH is just one of the many institutions and individuals researching HRV and using HRV in the monitoring and treatment of patients. Mayo Clinic, Stanford University Hospital and Clinics, and Mount Sinai Medical Center and School of Medicine are among the many prestigious research centers studying HRV and using it in clinical practice.

SweetBeat Description

In the *past*, HRV measurement required expensive hardware and software connected to your PC. Now SweetBeat, the stress management iPhone app from SweetWater Health, can measure HRV on your iPhone or iPad using off the shelf heart rate monitors.

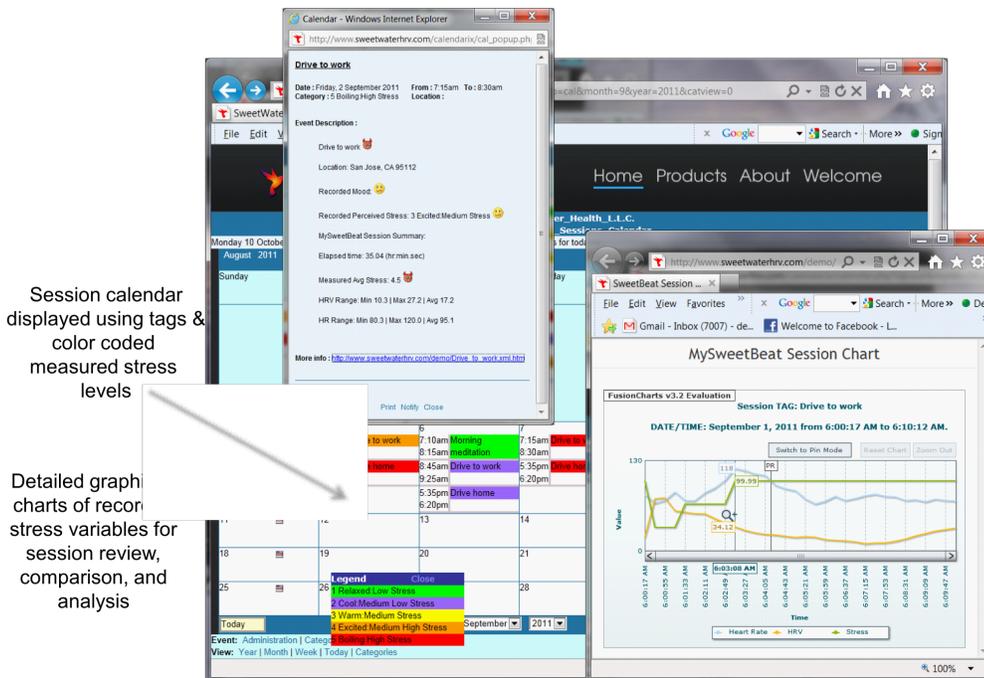
The SweetBeat stress management system consists of the SweetBeat app and the MySweetBeat web portal. Sessions run on the app can be uploaded to a secure and private web portal for tracking and reviewing from any internet enabled computer or mobile device. Figure 2 provides a brief description of the SweetBeat app and Figure 3 shows some of the tracking tools available in MySweetBeat.

Figure 2: MySweetBeat App Description



Source: SweetWater Health, LLC

Figure 3: MySweetBeat Tracking Tools



Source: SweetWater Health, LLC

Yoga and SweetBeat

An article in Science Daily, explores the same study as Mary Kyle in EmpowHER except more depth. The author writes, “Anecdotal evidence would suggest that yoga practice may improve health through breathing exercises, stretching, postures, relaxation, and meditation.” Not only does this study relate Yoga to a high HRV, but it boasts the spectral analysis of HRV, “An important tool in exploring heart health and the mechanisms of heart rate regulation. The power represented by various spectral bands in short-term HRV are indicative of how well the heart responds to changes in the body controlled by the sympathetic and the parasympathetic nervous systems.”³

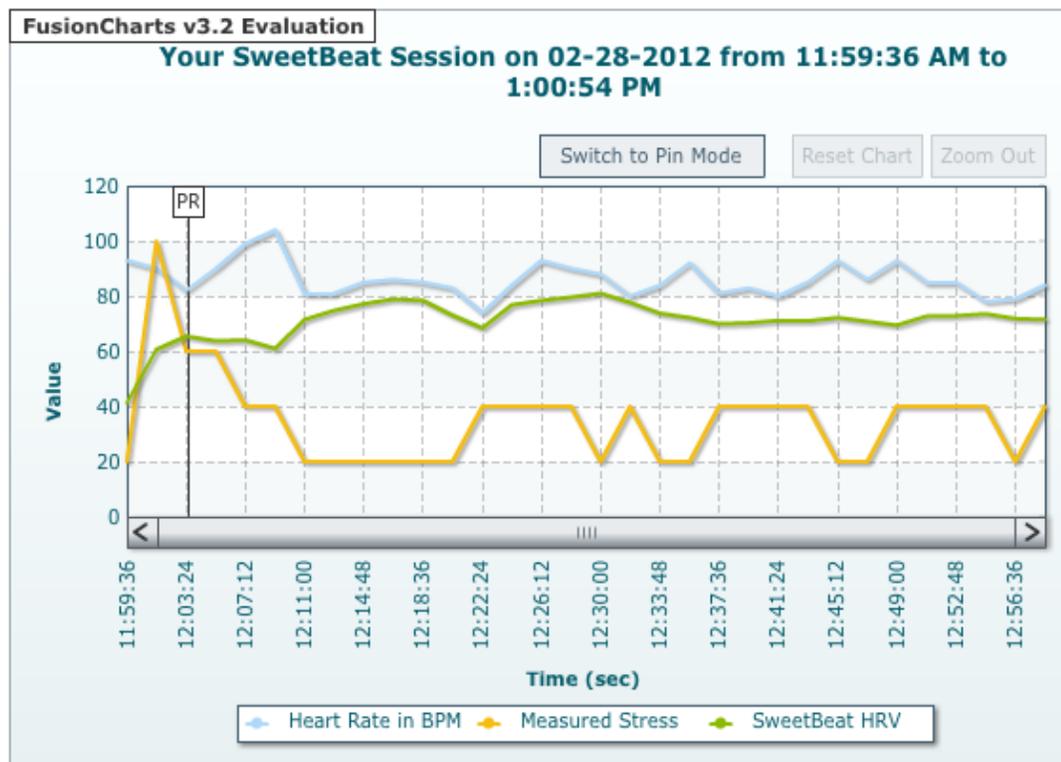
Using yoga within your classes and with your clients will allow you to see the science behind yoga. We are currently conducting a case study to see how yoga 2 to 3 times a week will effect the heart rate variability of a female subject, age 24, who has a very low HRV.

HRV is a reflection of the parasympathetic branch and is expressed as a number between 0-100. Note that the average person reads between 50 and 80 and a high HRV is desirable.

The stress level is a representation of the balance of the two branches of the nervous system. These two branches are the sympathetic branch, which represents fight or flight, and the parasympathetic branch, which represents relaxation, repair and recovery. A low stress value indicates that the parasympathetic is dominant. As the sympathetic branch become more dominant than the parasympathetic branch, the stress value increases. People who are always in a high stress state may be chronically stressed.

Figure 4 is a session from Patient A's Qi-Gong class. Referring to Figure 4, you can see the HRV value (green line) shoot up in the beginning when the class starts. When the class gets going, the HRV stays relatively stable, which means that Patient A's parasympathetic branch was reasonably stable. The measured stress (orange line) goes down dramatically in the beginning and stays fairly low the entire session.

Figure 4. Patient A's Qi-Gong Session



Source: SweetWater Health, LLC

With the SweetBeat app and the secure MySweetBeat portal, you will be able to:

- Measure a particular client's HRV before and after the yoga session
- Recommend SweetBeat to your students to measure HRV between yoga classes, encouraging them to keep an eye on stress throughout the week
- Measure their HRV during an yoga session to measure efficacy of particular poses
- Upload individual client HRV sessions to MySweetBeat for tracking and review
- E-mail your patients their session summaries from previous sessions.

If patients wish to purchase their own heart rate monitors and apps, they can run their own sessions and upload to the same or separate account than their acupuncture account.

Research

Below is a short compendium of several studies done on yoga with the measurement of heart rate variability.:

In the study, "Effects of yoga on the autonomic nervous system, gamma-aminobutyric-acid, and allostasis in epilepsy, depression, and post-traumatic stress disorder," a theory is proposed that yoga restores the body to optimal homeostasis after a stressful or traumatic event. As stated before, stress activates the sympathetic nervous system, deactivating the parasympathetic nervous system and creating an imbalance. Researchers found that, "According to the proposed theory, the decreased PNS and GABAergic activity that underlies stress-related disorders can be corrected by yoga practices resulting in amelioration of disease symptoms. This has far-reaching implications for the integration of yoga-based practices in the treatment of a broad array of disorders exacerbated by stress."⁴

In the study, "Effect of integrated yoga on stress and heart rate variability in pregnant women," not only did the stress decrease by 31.57% in the yoga group but it increased by 6.60% in the control group that was not doing yoga. Results show, "the high-frequency band of the heart rate variability spectrum (parasympathetic) increased by 64% in the 20th week and by 150% in the 36th week." The researchers concluded, "Yoga reduces perceived stress and improves adaptive autonomic response to stress in healthy pregnant women."⁵

In an article by Kelly McGonigal, psychologist and yoga teacher at Stanford University, she quotes two studies relating yoga to better autonomic nervous system function.

"One of the first studies was conducted at Newcastle University in England and published in 1997 in the European Journal of Clinical Investigation. Researchers found that six weeks of practicing hatha yoga increased the activation of the parasympathetic nervous system (the calming side) without decreasing the influence of the sympathetic (the arousing side)."

"A second study, done by researchers at the University of Schleswig-Holstein in Germany and published in 2007 in the journal Evidence-Based Complementary and Alternative Medicine, suggests that even a single session of yoga practice can encourage the nervous system to find flexibility and balance."

Kelly goes on to describe the subjects of the second study as being "in a state of autonomic balance and flexibility driven by the parasympathetic – which is exactly the type of balance and flexibility that predicts greater resilience to stress."⁶

Implementation

The steps are easy:

1. Buy compatible heart rate monitor at beathealthy.com/healthsensors



2. Buy SweetBeat app on iTunes.com
3. Record session
4. Create an account and upload session to the private and secure MySweetBeat database
5. Track through the MySweetBeat portal, <http://www.sweetwaterhrv.com>

MySweetBeat™ for the Web

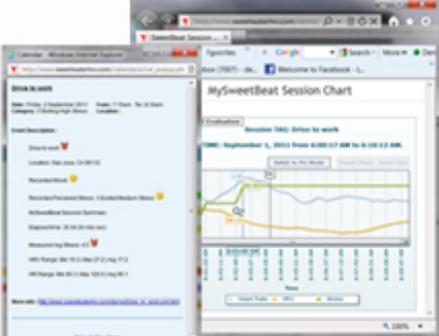
Review and analyse SweetBeat session details online



MySweetBeat calendar displays and tracks SweetBeat sessions



Share SweetBeat session summaries on Facebook and Twitter



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References

¹"The Analysis of Mental Stress Using Time-Frequency Distribution of Heart Rate Variability Signal," H.M. Seong; J.S. Lee; T.M. Shin; W.S. Kim; Y.R. Yoon; Y.R. Yoon; Proceedings of the 26th Annual International conference of the IEEE EMBS, September 2004.

²Kyle, Mary. "Heart Healthy Benefits of Yoga." EmpowHER.com. EmpowHER Media, 05 Feb. 2012. Web. 14 Feb. 2012. <<http://www.empowher.com/heart-disease/content/heart-healthy-benefits-yoga>>.

³Inderscience Publishers. "Yoga boosts heart health, new research finds." ScienceDaily, 9 Nov. 2009. Web. 18 Mar. 2012. <<http://www.sciencedaily.com/releases/2009/11/091109121216.htm>>.

⁴Streeter, C. C., P. L. Gerbarg, R. B. Saper, D. A. Ciraulo, and R. P. Brown. Effects of Yoga on the Autonomic Nervous System, Gamma-aminobutyric-acid, and Allostasis in Epilepsy, Depression, and Post-traumatic Stress Disorder. PubMed.gov. U.S. National Library of Medicine, 24 Feb. 2012. Web. 18 Mar. 2012. <<http://www.ncbi.nlm.nih.gov/pubmed/22365651>>.

⁵Satyapriya, M., H. R. Nagendra, R. Nagarathna, and V. Padmalatha. Effect of Integrated Yoga on Stress and Heart Rate Variability in Pregnant Women. PubMed.gov. U.S. National Library of Medicine, Mar. 2009. Web. 18 Mar. 2012. <<http://www.ncbi.nlm.nih.gov/pubmed/19110245>>.

⁶McGonigal, Kelly. "Tame Your Stress." Healthy Living Concierge. 04 Apr. 2007. Web. 18 Mar. 2012. <<http://hlcnaples.weebly.com/1/post/2011/4/tame-your-stress-by-kelly-mcgonigal.html>>.