

The Impact of HeartMath's Resilience and Stress Reduction Programs and Technology on Health Outcomes across Diverse Populations

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EXECUTIVE SUMMARY

Since 1991, HeartMath has researched and refined a set of unique tools and proprietary technology designed to measurably improve resilience, performance, health and productivity, while dramatically reducing stress. Published studies and hundreds of client outcomes confirm the effectiveness in corporate and health care settings around the world, making HeartMath the leader in stress reduction solutions.

The HeartMath programs and technologies are a comprehensive, multidimensional solution designed to work independently or within existing wellness programs. The HeartMath Programs measurably and immediately re-train the human stress response to a healthier, more productive function.

Our Fortune 500 case studies substantiate the effectiveness of the program. This document highlights key health and performance outcomes in corporate, government and healthcare staff and patient populations.

ORGANIZATIONAL

Improvement in Health Cost Trend

- An actuarial analysis of the health claims at this NYC non-profit compares the impact of the HeartMath program on 2007 and 2008 medical and pharmacy utilization of HeartMath Participants (143) compared to Non-Participants (343).
- Medical trend: 3.8% *decrease in costs* for HeartMath Participants and 9% *increase* for non-participants.
- HeartMath Participants had a 22.5% *decrease in charges* for Essential Hypertension diagnosis, whereas Non-Participants had a 46.9% *increase* in charges for Essential Hypertension.
- **First year ROI = 2:1**

Analysis conducted by McCarthy Actuarial Consulting, LLC claims data provided by the claim administrator

Improvement in Metabolic Syndrome Risk

- Two 2009 Metabolic Syndrome studies showed significant improvements. In one study with an online travel company there was a 59% **reduction in number of participants with Metabolic Syndrome**, elevated blood pressure went from 40% of participants to 15%; elevated blood glucose from 40% to 20%; plus significant reduction in triglycerides. The other study with an energy company showed people with elevated total cholesterol dropping from 41% to 22%; elevated LDL from 68% to 40% and cholesterol from 29% to 17%.

Reduced Turnover:

- A Fortune 50 high tech firm customer service department **cut stress 50%** and improved customer listening 33%. Employee well-being, productivity and job satisfaction increased, and turnover decreased.
 - Total estimated savings -- **\$632,539**

- ROI: greater than 4:1

Increased Staff Retention:

- Several HeartMath clients have seen double-digit improvements in staff retention within the first year of implementing the HeartMath program. Based on the historical retention data and cost to train, first year (ongoing) savings ranged from \$800,000 to \$3,900,000.

Safety Improvement

- A retail pharmacy chain was well aware that stress clearly affects all aspects of work performance of the employees, including “incident rate” referring to medication errors. They conducted HeartMath stress management intervention for 220 pharmacists across multiple locations, measuring stress, well-being and incidents.
 - Significant improvements were seen in fatigue, anxiety, depression, anger, resentfulness, stress symptoms, morale issues, time pressure and stress.
 - The client reported a **40-71% reduction in incidents**.

Reduction in Lifestyle Risk Factors:

- Subjects in an experimental group of correctional officers demonstrated reductions in stress and health risk factors. Physiological improvements included **reductions in total cholesterol, LDL cholesterol levels, the total cholesterol/HDL ratio, fasting glucose levels, mean heart rate, and systolic and diastolic blood pressure**. Psychological changes included reductions in overall psychological distress, anger, fatigue, hostility, interpersonal sensitivity, speed and impatience, and global Type A behavior, and increases in gratitude and positive outlook. There were also increases in productivity, motivation, goal clarity, and perceived manager support. The reduction in health risk factors were projected to correspond to reductions in health care and absentee costs.
 - **Total projected annual cost savings = \$1179 per employee.**

Health and Quality:

- A Fortune 100 high tech manufacturer showed executive health improvements plus award winning study with managers, engineers and factory workers.
 - Hypertensive executives **all lowered blood pressure to normal range**.
 - Productivity and Quality improvements on a manufacturing line = **22% drop in defects**.
 - Contentment, job satisfaction and communication significantly increased, while tension, anxiety, nervousness and **physical symptoms of stress significantly decreased**.

CLINICAL HIGHLIGHTS

(For more information see Abstracts in Research Summaries section at the end of the document)

Blood Pressure:

- The treatment group exhibited a mean adjusted reduction of **10.6 mm Hg in systolic BP and of 6.3 mm Hg in diastolic BP**. This adjustment is similar to expected decreases due to hypertensive

pharmaceuticals. The treatment group also demonstrated improvements in emotional health, stress symptoms, depression, and global psychological distress, and saw significant increases in peacefulness and positive outlook.

Congestive Heart Failure:

- Significant improvements ($p < 0.05$) were noted in perceived stress, emotional distress, 6-minute walk (**14% improvement in functional capacity**), and depression, and positive trends were noted in each of the other psychosocial measures. A control group saw deterioration in these same measures.

Atrial Fibrillation:

- A hospital pacemaker clinic conducted a three-month study using HeartMath home-study / coaching intervention for seventy-five patients with atrial fibrillation. At the end of the three-month period:
 - **71 of the 75 patients reported substantial improvements in their physical and emotional health.**
 - **Fifty-six patients had significantly fewer symptomatic episodes of atrial fibrillation and were able to reduce their anti-arrhythmic and anti-hypertensive medications under their physician's guidance.**
 - **Fourteen discontinued their anti-arrhythmic medications under physician supervision.**

Diabetes:

- A regression analysis from a study of 22 participants revealed a significant relationship between self-reported practice of the techniques learned in a HeartMath program and the change in HbA1c levels in patients with Type 2 diabetes. HeartMath practice resulted in **1% reduction in HbA1c**. Participants experienced reductions in **anxiety, depression, anger and distress**, following the intervention. Participants showed **reduced sensitivity to daily life stressors**, and **quality of life significantly improved**.

KEY CLIENT PROJECTS

BUSINESS

Boeing

- Senior managers and senior engineers from the Boeing Commercial Airplane Group were under a tight deadline to deliver the 767-400 ERX airplane with severe late delivery penalties and limited operating budget.
- Productivity improvement: project delivered on time and under budget with 12% productivity gain.
- Decreased Stress levels, morale and performance improvement
- Approximately 1000 staff were subsequently trained in the HeartMath techniques.

BP

- HeartMath worked with BP on four continents since 1998, training more than 3,000 BP leaders, managers, and line staff.
- BP has estimated \$1bn in annual costs globally due to the impact of stress and other risks on absenteeism, health care costs, etc.
 - In 2006, BP launched a Mental Health initiative to address the problem. HeartMath was offered as the only global solution for stress.
- HeartMath has been implemented at BP Houston as part of their health initiatives.

Shell:

- Shell identified stress as the number one employee risk through an employee survey.
- Based on data collected on the HeartMath program's effectiveness at Shell since 1997, the HeartMath program has been implemented within ExPro (Exploration & Production) in Houston, New Orleans, and the Netherlands.
- Previous research on 8 Shell oil platforms in the North Sea showed improvements in safety as a result of the HeartMath program.

Blue Cross Blue Shield of Tennessee (BCBST)

- HeartMath's program has been rolled out to over 1,000 customer service, government, sales and marketing and nursing staff, as part of their corporate wellness initiative to improve employee performance and productivity, while reducing stress.

Unilever

- HeartMath productivity and performance tools - including the emWave PC® and emWave - have been provided to corporate staff in London and Rotterdam.
- A Unilever study in the Netherlands found a significant improvement in blood pressure, DHEA, body mass index and waist-hip ratio as a result of practicing HeartMath techniques.

Motorola

- Executive health improvements plus award winning study with managers, engineers and factory workers.
 - Results showed:
 - Contentment, job satisfaction and communication significantly increased
 - Tension, anxiety, nervousness and physical symptoms of stress significantly decreased.
 - Blood pressure in hypertensive individuals decreased
 - 93% demonstrated increased productivity
 - Manufacturing line saw a 22% drop in defects.
 - The HeartMath project won Motorola's Outstanding Process Creativity Award in their corporate-wide Total Customer Satisfaction (TCS) annual competition.

GOVERNMENT

- Kansas National Guard Pre-Deployment Stress Program - 2008/2009

- Based on successful use of emWave technology for PTSD
- Used for pre and post deployment
- 35 VA Medical Centers - PTSD coaching with emWave
- NASA - Goddard Space Flight Center
 - Excellent outcomes - multiple programs for leaders
- Lawrence Livermore National Laboratories
 - Ongoing programs since 1999
- World Bank - IFC
- Office of Personnel Management
- All four branches of US Military
- US Department of Education
- Department of Defense
- FDA
- FAA
- IRS
- California Department of Justice
- California Department of Corrections
- CalPERS
 - Published study

HEALTH CARE

Duke University Health System

- A HeartMath program with 350 staff in Duke's Emergency Services division began Q1 '06.
 - Retention improved from 36% to 5% for 250 staff trained
 - *Est. savings: >\$3 million (1 of 3 initiatives - HM received 1/3 of the credit)*
- Duke's Nursing Leadership Team of 180 nurse managers and directors received HeartMath training and the emWave Personal Stress Reliever Q1 '07. Dramatic improvements in anxiety, inadequate sleep, fatigue, and well-being have been noted. Intent to quit has also improved, representing significant cost savings to the organization.
- HeartMath's emWave technologies are being used in Duke's Oncology department and Diet and Fitness program.

Stanford Hospital and Clinics

- HeartMath's *Transforming Stress* program is regularly offered to clinical staff as part of Stanford Hospital's public professional education and development series.
- A pilot study conducted through Stanford School of Medicine on congestive heart failure included HeartMath training (see Research Summaries above)

Center for the Health Professions (at UCSF)

- HeartMath's *Power to Change Performance* program is part of the Center's curriculum for:
 - Kaiser Pharmacy Leaders
 - California Health Care Fellows Program
 - Catholic Healthcare West (CHW) Pharmacy Leaders
- The emWave PC technology is being used at UCSF's Integrative Medicine Center

Sutter Health

- 650 leaders in Sutter's Sac/Sierra region have received HeartMath training.
- More than 100 physicians from the Palo Alto Medical Foundation have received training.
- Mills Peninsula Hospital's 200 administrative and clinical leaders received HeartMath training, along with the emWave PSR (Handheld) Q2 '07.
- Sutter East Bay Medical Group is piloting HeartMath programs to their patients as part of a wellness initiative.

Kaiser Permanente

- HeartMath programs and technology have been used throughout the Kaiser system:
 - Pain management clinics
 - Leadership training for pharmacy leaders
 - Psychiatry leaders for mental health improvement
 - Call center training to reduce absenteeism
 - Nurse retention and nurse leadership

Swedish Medical Center (part of HCA)

- Reported staff turnover improvements from 22% to 9% for the first 600 staff trained in the HeartMath program, saving 78 jobs.

Sierra Providence Health Network (part of Tenet)

- In the first year, for HeartMath-trained staff:
 - Reduced nurse turnover from 21% to 3% in the first year.
 - Reduced overall staff turnover from 21% to 5% in the first year.
- Based on Staff Turnover cost of \$48,000, the network saved:
 - 19 nursing jobs = \$912,000
 - 45 overall jobs = \$2,160,000

Delnor-Community Hospital (Chicago, IL)

- Delnor has successfully maintained employee turnover at 14% since they began working with HeartMath in 2000.
 - The turnover rate for HeartMath-trained staff has held consistently at 6% for five years.
 - First year's savings for retention improvements was approximately \$800,000.
- Delnor has been ranked #1 nationally in employee satisfaction the last four consecutive years, according to a survey of community hospitals.

- Delnor's customer (patient) satisfaction scores have consistently exceeded the 90th percentile range.
- Delnor won the 2002 Corporate Health and Productivity Management Award (along with Lockheed Martin and Pitney Bowes).

Kersh Wellness

- Has embedded the emWave PC into their Health Station kiosks and companion website.

HealthVault - Microsoft

- The emWave® PC Stress Relief System will be connected to Microsoft's free consumer health platform, HealthVault.

HeartMath has health care system clients in New York, California, Oklahoma, Texas, Indiana, Illinois, Florida, Minnesota, North Carolina, Tennessee, Oregon, and Hawaii.

EXECUTIVE EDUCATION

Stanford University Graduate School of Business

- HeartMath learning and performance technologies have been part of the Stanford Executive Program since 1998.
- Program focuses on helping the 100+ global executives:
 - Maximize the learning experience at Stanford through the aid of emWave Personal Stress Reliever.
 - Transition back to their home country, company and family after six weeks of intense business and professional development at Stanford.

London Business School

- HeartMath's *Power to Change Performance* program and emWave technology have been imbedded in various MBA and executive education programs at London Business School.

International Center for Leadership in Finance (Kuala Lumpur)

- HeartMath's *Power to Change Performance* program is a core component of a four week leadership program for senior executives of Malaysian, Singaporean and Asian companies, delivered twice a year in the US since 2004.

Global Institute for Leadership Development (GILD)

- The HeartMath program has been included in the leadership curriculum of this annual global conference, put on by Linkage.

Harvard Business Review

- HeartMath's research on executive health and stress reduction was featured in the July 2003 issue, entitled "Pull the Plug on Stress."

RESEARCH SUMMARIES

Abstracts: Hypertension, Congestive Heart Failure, Workplace Stress, Diabetes*

Impact of a Workplace Stress Reduction Program on Blood Pressure and Emotional Health in Hypertensive Employees

Rollin McCraty, Ph.D., Mike Atkinson, and Dana Tomasino, B.A.

Journal of Alternative and Complementary Medicine. 2003; 9(3): 355-369.

Abstract

Objectives: This study examined the impact of a workplace-based stress management program (HeartMath) on blood pressure (BP), emotional health, and workplace-related measures in hypertensive employees of a global information technology company.

Design: Thirty-eight (38) employees with hypertension were randomly assigned to a treatment group that received the stress-reduction intervention or a waiting control group that received no intervention during the study period. The treatment group participated in a 16-hour program, which included instruction in positive emotion refocusing and emotional restructuring techniques intended to reduce sympathetic nervous system arousal, stress, and negative affect, increase positive affect, and improve performance. Learning and practice of the techniques was enhanced by heart rate variability feedback, which helped participants learn to self-generate physiological coherence, a beneficial physiologic mode associated with increased heart rhythm coherence, physiologic entrainment, parasympathetic activity, and vascular resonance. BP, emotional health, and workplace-related measures were assessed before and 3 months after the program.

Results: Three months post-intervention, the treatment group exhibited a mean adjusted reduction of 10.6 mm Hg in systolic BP and of 6.3 mm Hg in diastolic BP. The treatment group also demonstrated improvements in emotional health, including significant reductions in stress symptoms, depression, and global psychological distress and significant increases in peacefulness and positive outlook. Furthermore, the trained employees demonstrated significant increases in the work-related scales of workplace satisfaction and value of contribution.

A Controlled Pilot Study of Stress Management Training of Elderly Patients with Congestive Heart Failure

Frederic Luskin, PhD, Megan Reitz, BA, Kathryn Newell, MA, Thomas Gregory Quinn, MD, William Haskell, PhD

Preventive Cardiology 2002; 5(4):168-172, 176.

Abstract

The purpose of this study was to evaluate the effect of stress management training on quality of life, functional capacity, and heart rate variability in elderly patients with New York Heart Association class I-III congestive heart failure (CHF). While substantial research exists on stress management training for patients with coronary heart disease, there are few data on the value of psychosocial training on patients with CHF. Thirty-three multiethnic patients (mean age, 66±9 years) were assigned through incomplete randomization to one of two treatment groups or a wait-listed control group. The 14 participants who completed the treatment attended eight training sessions during a 10-week period. The training consisted of 75-minute sessions adapted from the Freeze-Frame stress management program developed by the Institute of HeartMath. Subjects were assessed at baseline and again at the completion of the training. Depression, stress management, optimism, anxiety, emotional distress, and functional capacity were evaluated, as well as heart rate variability. Significant improvements ($p < 0.05$) were noted in perceived stress, emotional distress, 6-minute walk, and depression, and positive trends were noted in each of the other psychosocial measures. The 24-hour heart rate variability showed no significant changes in autonomic tone. The authors noted that CHF patients were willing study participants and their emotional coping and functional capacity were enhanced. This program offers a simple and cost-effective way to augment medical management of CHF. Given the incompleteness of CHF medical management and the exploding interest in complementary medical intervention, it seems imperative that further work in psychosocial treatment be undertaken.

Emotional Self-Regulation Program Enhances Psychological Health and Quality of Life in Patients with Diabetes

Rollin McCraty, Ph.D., Mike Atkinson, and Lee Lipsenthal, M.D.

HeartMath Research Center, Institute of HeartMath, Publication No. 00-006. Boulder Creek, CA, 2000.

Summary

Aims: This pilot study was designed to assess changes in psychological status, quality of life and hematologic measures predictive of long-term health and well-being in patients with diabetes following a stress reduction and emotional self-regulation program.

Methods: Twenty-two patients with Type 1 or Type 2 diabetes mellitus participated in a 2-day HeartMath workshop, a research-based program developed to reduce stress and negative affect, increase positive affect and reduce inappropriate autonomic nervous system activation. Self-report measures of stress, psychological status and quality of life were administered before and six months following the intervention. Hemoglobin A1c, cholesterol and triglycerides, and blood pressure were also assessed.

Results: Participants experienced significant reductions in psychological symptomatology and negative emotions, including anxiety, depression, anger and distress, following the intervention. Significant increases in peacefulness, social support and vitality were also measured, as well as reductions in somatization, sleeplessness and fatigue. Participants showed reduced sensitivity to daily life stressors after the intervention, and quality of life significantly improved. Regression analysis revealed a significant relationship between self-reported practice of the techniques learned in the program and the change in HbA1c levels in patients with Type 2 diabetes. Increased practice was associated with reductions in HbA1c.

Conclusions: Results suggest that the HeartMath emotional self-regulation intervention reduces stress, improves psychological health, enhances quality of life and may improve glycemic control in individuals with diabetes. Replication of this study with a non-treatment control group is necessary to confirm these findings.

An Inner Quality Approach to Reducing Stress and Improving Physical and Emotional Wellbeing at Work

Bob Barrios-Choplin, Ph.D., Rollin McCraty, Ph.D., and Bruce Cryer, M.A.
Stress Medicine 1997; 13(3): 193-201.

Summary

This exploratory field study examined the impact of an Inner Quality Management program (IQM) on a group of Motorola employees. IQM is a training program designed to help people increase productivity through improved health, communication, goal clarity, positive mood and job satisfaction, and through the reduction of tension, burnout, physical symptoms of stress and negative mood. Both psychological and physiological measures were assessed in the 6-month study. The study involved three groups: managers, engineers and factory workers. Results showed that contentment, job satisfaction and communication significantly increased after the training, while tension, anxiety, nervousness and physical symptoms of stress significantly decreased. Blood pressure in hypertensive individuals decreased, and there was reduction in sympathetic nervous activity. Implications for workplace wellbeing are discussed.

Impact of the Power to Change Performance Program on Stress and Health Risks in Correctional Officers

Rollin McCraty, Ph.D.*, Mike Atkinson*, Lee Lipsenthal, M.D.*, and Lourdes Arguelles, Ph.D.**

*HeartMath Research Center, Institute of HeartMath, Boulder Creek, CA

**Claremont Graduate University, Claremont, CA

HeartMath Research Center, Institute of HeartMath, Report No. 03-014. Boulder Creek, CA, November 2003.

Summary

This study investigated the impact of HeartMath's Power to Change Performance stress and health risk reduction program on physiological and psychological stress and health risk factors in a sample of correctional peace officers. Eighty-eight officers from three facilities were randomized to an experimental group and a wait-list control group. The experimental group participated in the stress and health risk reduction program, which was delivered over two consecutive days. The program included instruction on health risk factors as well as training in positive emotion-focused stress reduction techniques intended to reduce negative emotional arousal, improve physiological balance, increase positive affect, and enhance performance.

Learning and practice of the techniques was enhanced by heart rate variability feedback, which helped participants learn to self-generate physiological coherence, a beneficial mode associated with increased efficiency and synchronization in the functioning of physiological systems. Measures of physiological and psychological stress and health risk were assessed before the program and again 3 months afterward. The measures included in the health risk assessment were the Personal Wellness Profile self-report survey, which assesses a broad range of health-related information, behaviors, and attitudes; and four biometric markers: height, weight, blood pressure, and total cholesterol levels. Additional measures reflective of physiological stress and overall health included cortisol and DHEA, secretory immunoglobulin A (an immune system marker), HDL and LDL cholesterol, triglycerides, fasting glucose levels, a 10-minute resting electrocardiogram, and measures of heart rate variability (an indicator of autonomic function). Three self-report psychological surveys were also included to assess emotional stress and work-related variables.

An analysis of baseline data revealed that officers in this study were under greater stress and at greater health risk in comparison to a reference sample of working adults. A within-group analysis of pre-post changes showed that 3 months after the intervention program, employees in the experimental group demonstrated significant reductions in stress and health risk factors, as well as significant improvements in work-related parameters. Physiological changes in the experimental group included significant reductions in total cholesterol, LDL cholesterol levels, the total cholesterol/HDL ratio, fasting glucose levels, mean heart rate, and systolic and diastolic blood pressure. Psychological changes included significant reductions in overall psychological distress, anger, fatigue, hostility, interpersonal sensitivity, speed and impatience, and global Type A behavior, and increases in gratitude and positive outlook. There were also improvements in key organizationally relevant measures in the experimental group after the program, including significant increases in productivity, motivation, goal clarity, and perceived manager support. Finally, the reduction in health risk factors achieved in this study are projected to lead to reductions in both health care and absentee costs, yielding a total projected annual cost savings of \$699 per employee.

In conclusion, the results of this study indicate that the Power to Change Performance program was effective in significantly reducing stress and health risk factors in a population of correctional peace officers, while enhancing employee productivity and psychological well-being. These changes were realized with minimal intervention and in a relatively brief period of time, and should result in significant cost savings to the organization if the program is expanded to larger employee populations. Thus, by reducing the physiological, psychological, performance-related, and financial impact of high stress and health risks in the crucial and demanding profession of corrections work, this program promises significant benefits both to the employees as individuals and to the organization as a whole.