

Coherence, care and inspiration: The power to heal organisations and ourselves

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I have had an interest in complementary approaches to health for 40 years and have worked extensively in the fields of resilience, stress reduction and emotional wellbeing through the US-based Institute of HeartMath, where I was a founding director in 1991. I have consulted to the NHS in both London and Glasgow implementing research-based programmes to not only utilise innovative stress reduction techniques and technology to improve cardiovascular and cognitive function, but also to improve the quality of patient care. My own resilience skills were put to the test in 2009 when I was diagnosed with Stage I bladder cancer, and later had to overcome MRSA and recover from double hip replacement. Now healthy again and thriving, I hope to inspire people to live fully in spite of the difficult challenges life can bring.

Summary

Organisations are asked to change like never before. Simultaneously the stress on many individuals is higher than ever. How can we expect to create sustainable compassionate organisations, particularly in the NHS, when the frontline providers remain under excessive pressure? New research, tools, technology and a promising pilot programme provide hope and inspiration.

Through my teenage years and well into my 20s, my deepest interests were in fostering social cohesion, peace, health, wellbeing, personal and spiritual development, and optimal performance. Some of these interests became a vocation in 1980 when I joined the executive team of a biotech company. But the overriding interest I held was in the power of one's emotional life to create joy or sorrow, happiness or pain, optimism or depression in all dimensions of our life. This interest inspired me in 1991 to join the founding team of the non-profit Institute of HeartMath when it was launched in the hills above Silicon Valley in California. Since then I have been privileged to help build programmes leveraging new understandings of human physiology, heart-brain interactions, positive emotion, and mind-body medicine.

I have found that being inspired by beauty in nature, music, poetry, acts of heroism, or a deep conversation, always gave me new energy and

fortitude to heal and to grow. Indeed over the past 20 years, the idea that positive emotions can play a significant role in health and wellbeing has gained widespread acceptance (see www.authentic happiness.sas.upenn.edu/Default.aspx). Research into the impact of cognitive behavioral therapy, mindfulness practise, positive psychology and the emotional intelligence asserts our emotional life plays an active part in the regulation of biological processes. The neurobiology of emotions and how they arise in the body and brain is being widely studied, and their effect on our risk of developing chronic disease, our longevity, our social support, our cognitive health, even our fundamental quality of life is increasingly understood.

The concept of coherence

Coherence implies orderly structure. It stands alongside other metaphors

like harmony and alignment. Coherence is something we seem to sense within and among systems – whether in atoms, organisms, organisations, or social networks. As a subjective experience, most people know what a ‘harmonious’ state feels like: moments where our hearts, minds and bodies are united in a sensing of wholeness. This state has been called ‘the zone’, ‘flow’, ‘oneness’ etc, and typically when we are in such states we feel connected not only to our deepest selves but also to others, even to the Earth itself. We may feel inspired. At HeartMath we have come to call this state of internal and external connectedness *coherence*.

Programmes aimed at enhancing staff resilience can increase patient satisfaction

The coherent heart rhythm of positive emotions

Yet coherence, we have learned, is more than just an apt metaphor; for we have found it to be something measurable, and that its effects can be gauged for instance in terms of how it impacts on organisational efficiency and patient care, as well as individual self-care and health. The Institute of HeartMath introduced the terms *cardiac coherence* and *psychophysiological coherence* in the early 1990s to describe the degree of order, harmony and stability in the various rhythmic activities within the human system over a given time period (Tiller *et al* 1996). This harmonious order signifies a *coherent system*, whose efficient, optimal function is directly related to the ease and flow in life processes. By contrast, an erratic, discordant pattern of activity denotes an *incoherent system* whose function will reflect stressful and inefficient utilisation of energy in life processes. Testing our early theories that positive emotions would lead to measurably more coherent internal processes for people, we learned that positive emotions such as appreciation and compassion are indeed reflected in a heart rhythm pattern that is more coherent (McCraty and Childre 2004) (see Figure 1).

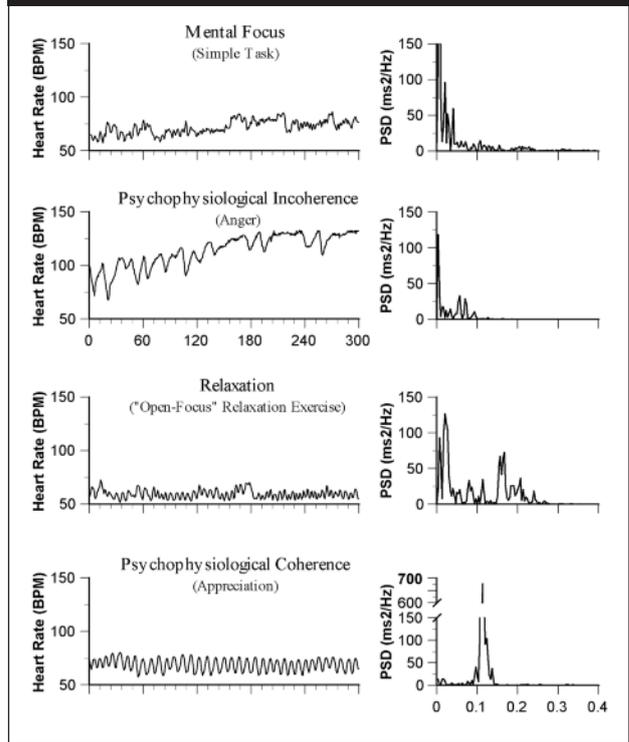
The left-hand graphs are heart rate tachograms which show beat-to-beat changes in heart rate. To the right are the heart rate variability (HRV) power spectral density (PSD) plots of the tachograms.

Mental focus is characterised by reduced HRV activity in all three frequency bands of the HRV power spectrum.

Anger, an example of psychophysiological Incoherence, is characterised by lower frequencies in the PSD plots, more disordered heart rhythm pattern and an increasing mean heart rate. As can be seen in the corresponding power spectrum, the PSD plot during anger is primarily in the very low frequency region associated with increased sympathetic nervous system activity.

Relaxation on the other hand results in less higher frequency lower amplitude activity, indicating reduced sympathetic autonomic outflow. And in this case, there is

Figure 1: Emotions are reflected in heart rhythm patterns



also increased power in the high frequency region of the power spectrum, reflecting increased parasympathetic activity. (This is a typical PSD plot for the relaxation response).

Psychophysiological coherence is a functional mode measured by heart rate variability (HRV) analysis wherein a person’s heart rhythm pattern becomes more ordered and sine-wave-like at a frequency of around 0.1 Hz (1 cycle every 10 seconds). This state can be maintained by a combination of slow breathing and sustained positive emotion (in this example ‘appreciation’). This results in a highly ordered tachogram with a sine-wave-like heart rate variability pattern and, in the corresponding power spectrum, a large, narrow peak in the low frequency region, centred around 0.1 Hz. (Note the scale difference in the amplitude of the spectral peak during the coherence mode). This PSD pattern indicates increased synchronisation of the sympathetic and parasympathetic nervous system, and system-wide resonance due to entrainment between the heart rhythm pattern, respiration, and blood pressure rhythms. Though the coherence mode is also associated with increased parasympathetic activity – a key element of the relaxation response – it is physiologically distinct from relaxation in that the system is oscillating at its resonant frequency. In this coherent state there is increased harmony in heart–brain dynamics with enhanced synchrony of higher-level brain function and of the two branches of the autonomic nervous system (ANS). Simply put, coherence feels good, at least in part because our entire system becomes calmer and begins operating more efficiently.

Resilience

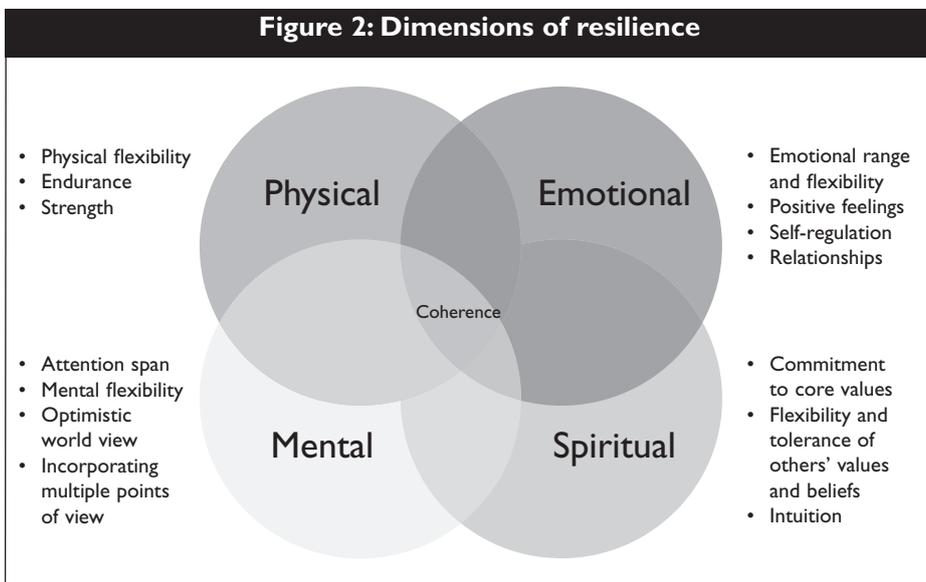
Some people apparently thrive even when conditions are harsh and pressures are high; though their life might be full of personal and professional change and difficulty, they seem to cope and recover more quickly. A considerable amount of research into stress suggests that such resilience is linked with a certain balance in the nervous system and with positive emotional wellbeing. Together these qualities sustain high performance at work and play, and so as stress and pressure mount in organisations, this capacity for resilience has become increasingly relevant; and crucially they want to know what erodes it and how it can be enhanced not only within individuals but across whole organisations. It is now clear that resilience is largely dependent on individuals' self-management, in the sense of their efficient use of energy resources across four domains; physical, emotional, mental and spiritual (see Figure 2).

resilience is characterised by a more rapid recovery after challenging situations, and a damping down of unnecessary or excessive stress reactions (eg frustration, impatience, anxiety) that would otherwise deplete our resources across all these domains.

Heart rate variability coherence

The naturally occurring changes in beat-to-beat heart rate reflect especially the functioning of the ANS, whose flexibility and adapt-ability exert a fundamental regulatory effect on all body-systems. It is well understood that too much ANS instability is detrimental to efficient physiological functioning and energy use but also that too little variation indicates depletion or even, pathology. Heart rate variability (HRV) analysis is now recognised as an excellent tool for assessing wellbeing, because neurocardiac function accurately reflects heart-brain interactions and ANS dynamics. The amount or range of overall HRV correlates

to a degree with age, younger people having higher levels than older ones. Low HRV is a strong and independent predictor of future health problems, including all causes of mortality, and it is associated with numerous medical conditions (May and Arildsen 2011). HRV is also an important indicator of psychological resiliency and behavioural flexibility as well as the ability to effectively adapt to changing social or environmental demands (McCraty *et al* 2009a). Hence HRV is in some sense a complex measure of the heart's interactions with multiple body systems. HeartMath sees this heart-brain relationship as



- *Physical resilience* is reflected in physical flexibility, adaptability, endurance and strength.
- *Emotional resilience* is reflected in one's ability to be inspired, to self-regulate emotions, along with building and sustaining relationships.
- *Mental resilience* is reflected in our attention span, mental flexibility, an optimistic worldview and ability to integrate multiple points of view.
- *Spiritual resilience* is associated with our commitment to core values, intuition, and tolerance of others' values and beliefs.

I would say that for myself, the fuel which creates and sustains my own resilience is *inspiration*. And in the HeartMath model this combination of coherence and feeling inspired, by increasing physiological efficiency and favouring the alignment of mental and emotional systems in turn supports further accumulation of resilience across all four domains. We have found that a high level of

critical to healthy mind-body functioning and so to overall wellbeing.

Heart rate variability coherence feedback

Heart rate variability coherence feedback can be used to learn self-regulation skills. Several HRV coherence training systems are increasingly used in healthcare, law enforcement, corporate, military and educational settings. Four systems – the three emWave and Inner Balance (iOS app) technologies available from HeartMath and another system from Wild Divine – can display heart rhythm in real time and record the levels of coherence achieved in real-time. Effective HRV coherence feedback has been shown to significantly improve outcomes in clinical populations with PTSD, depression, asthma, congestive heart failure, hypertension, anxiety, fibromyalgia, and insomnia (McCraty and Tomasino 2006a).

Research studies on coherence, cognitive performance, wellbeing, and safety

Coherence training also improves performance in a wide range of cognitive capacities, both short- and long-term. Examples include eye–hand co-ordination, speed and accuracy, and co-ordination in various sports as well as in tasks involving executive functions, focus and concentration, problem-solving, self-regulation, and abstract thinking (Bradley *et al* 2010). Coherence training has also been shown to improve overall health (including cardiovascular function) and well-being (McCraty and Tomasino 2006b).

- **ADHD and cognitive performance:** A UK study directly assessed cognitive performance in middle school students with clinically diagnosed attention deficit hyperactivity disorder and found a wide range of significant improvements (Lloyd *et al* 2010).
- **PTSD:** A US study conducted at a Veterans Affairs facility with soldiers who had recently returned from Iraq and had been diagnosed with PTSD found that a relatively short period of coherence biofeedback training resulted in significant improvements in cognitive functions, especially in the ability to self-regulate and inhibit negative responses, which correlated with coherence measures (Ginsberg *et al* 2010).
- **Stress and health care costs:** A US study of correctional officers with high workplace stress found reductions in total cholesterol, glucose, and both systolic and diastolic blood pressure, as well as significant reductions in overall stress, anger, fatigue and hostility with projected savings in annual health care costs of \$1,179 per employee (McCraty *et al* 2009). (Numerous additional employer-led studies in the US have shown similar health cost reduction benefits.)
- **Congestive heart failure:** A Stanford University study of patients with congestive heart failure showed significantly improved functional capacity and reduced stress and depression (Luskin *et al* 2002).
- **Diabetes:** A study of diabetes patients found improved overall quality of life and glycemic regulation, which correlated with use of the self-regulation techniques (McCraty *et al* 2000).
- **Lowering negative mood:** An analysis of the combined psychometric data from 3,129 matched pre-post coherence trainings found that fatigue, anxiety, depression and anger were reduced by almost half (McCraty and Childre 2010).
- **Medical safety:** A US workplace study conducted with 220 pharmacists across multiple locations found a reduction in medical errors ranging from 40% to 71% (HeartMath 2009).

Pilot results within the NHS

The Institute made the significant discovery that coherence associated with positive feelings such as appreciation, compassion, care and love has an impact beyond the individual experiencing them. It appears to entrain coherence in the object of these feelings too (Morris 2010). If this can be corroborated in further studies it would have obvious importance in any healing context: perhaps this might even be a physiological basis for the common experience that the presence of a genuinely caring and attentive caregiver feels much more ‘healing’ than dealing with a stressed caregiver who is under pressure, or who though well-intentioned is simply following a script for ‘patient care’. In my own two-year healing journey, I experienced the full spectrum of patient care and human emotions: some of the caregivers were extremely coherent, and therefore comforting and reassuring to me through each phase of surgery, testing, diagnoses, waiting, treatment, and healing. Unfortunately the presence of some others, who seemed less well-aligned with their career choice, only increased my anxiety. It would come as no surprise, given that stress can slow healing processes, if stressed caregivers exerted a similar effect by triggering stress responses in their patients. Likely as this seems, more research is yet to confirm this notion.

What is already established however is that programmes aimed at enhancing staff resilience can increase patient satisfaction and reduce medical error. The HeartMath Revitalising Care Programme has been used in a variety of hospital settings in the US, including the Mayo Clinic, Stanford University Health System, Duke University Health System, and Kaiser Permanente Medical centres. In the UK HeartMath has been introduced into large companies including Shell, Unilever, and GlaxoSmithKline. However, the HeartMath Revitalising Care Programme at Barts and the London NHS Trust, sponsored by chief nurse Kay Riley, was the first time that this programme has been piloted in an acute hospital setting in England. Evaluation of this pilot (which is summarised elsewhere in the issue of *JHH* – see page 23) showed improvements in all of the categories around personal stress and wellbeing. In eight of the ten categories these changes were statistically significant, with *fatigue* and *calmness* showing the greatest evidence of change. (The potential implications of these last two items on patient care should be noted.)

Previous HeartMath intervention studies have demonstrated improvements in personal stress and energy factors, especially so once the programme has been implemented more broadly across an organisation. Yet even on this small scale the significant changes made in all areas of this table suggest improvement not just to participants’ wellbeing and quality of life but also to their potential effectiveness.

Kay Riley had this comment about the programme: ‘I have always believed that to care for our patients to the highest standards, we must first properly care for our staff. The results of our HeartMath pilot strongly support this

concept; the outcomes are more impressive than any staff stress management or self-care programme that I have previously come across.’

A second pilot programme using HeartMath has already begun to build on the success of the first. It was completed in several NHS facilities in Scotland, through the sponsorship of chief nurse Ros Moore, and chief health professions officer Jacqui Lunday, and led by Choice Dynamics International. Results are not yet available.

We have found that HeartMath techniques and technology help enhance positive emotion, inspiration and coherence. These methods can bring significant benefit to individuals and perhaps especially to those providing frontline care, and both directly and indirectly to their patients. At a time when our organisations and indeed our entire society need to nurture caring in ways that are practical and sustainable, the HeartMath approach deserves serious consideration.

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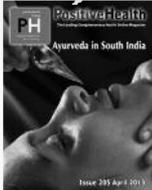
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