



## CASE STUDY

# Report on a Case Study Process Evaluation of a HeartMath Intervention and Faith Following a Traumatic Experience

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## ARTICLE INFO

## Article history:

Received 16 August 2024

Received in revised form 04 October

Accepted 10 October 2024

Available online 15 December 2024

doi: [10.51917/dialogo.2024.11.1.23](https://doi.org/10.51917/dialogo.2024.11.1.23)

## Keywords:

Case Study; Process Evaluation; Traumatic Experience; Heartmath Intervention; Faith;

## ABSTRACT

An initial study [1] was undertaken on a HeartMath intervention, focusing on coherence, resilience and faith following a traumatic experience. Quantitatively, there were significant post-intervention positive improvements in physiological coherence, and improvements in resilience and faith, and, qualitatively, positive integrated thematic changes in experiences of sense of coherence, resilience and faith. Correlations revealed various Sense of Coherence Scale items correlated with Brief Resilience Scale and Santa Clara Strength of Religious Faith Questionnaire items, and there were inter-related and overlapping experiences of sense of coherence, resilience and faith integrated themes and sub-themes. The first study's recommendations included that a case study process evaluation of a HeartMath intervention and faith following a traumatic experience be undertaken. The aim was to identify causal, correlation and relationship mechanisms of change. For this case study, the sample consisted of five participants purposefully selected from the original cohort. Information from a qualitative questionnaire on before, during and after intervention experience of sense of coherence, resilience, faith and HeartMath, as well as the HeartMath intervention, were collected. Emerging causal, correlation and relationship mechanisms of change in the form of integrated themes and sub-themes are discussed.

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**Cite this article:** EDWARDS, David J., Yolanda Dreyer & Ben J.M. Steyn. "Report on a Case Study Process Evaluation of a HeartMath Intervention and Faith Following a Traumatic Experience." *DIALOGO*, ISSN: 2393-1744, vol. 11, issue 1 (December 2024): pp. 323-335. DOI: <https://doi.org/10.51917/dialogo.2024.11.1.23>

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## 1. INTRODUCTION

Many people will go through a traumatic experience [2]. These experiences can affect faith [3, 4, 5, 6]. Christianity was the religion central to this research [7, 8, 9]. This research concentrated on pastoral care and counselling [10], which can focus on specific areas such as overcoming traumatic experiences [5, 11, 12]. Many traditional psychological methods and techniques use cognitively orientated approaches. Differentially but complementary, HeartMath is a newer psychophysiological approach. Founded in 1997, HeartMath has been presented and discussed as a scientific meditation method in dialogue with theological phenomena [13]. It is concerned with coherence [14], specifically psychophysiological coherence, which is a state of synchronisation between heart, brain and autonomic nervous system [15], and sense of coherence (SOC), which includes the three areas of comprehensibility, manageability and meaningfulness [16, 17, 18]. HeartMath also provides a scientific foundation for resilience [19], with a psychophysiological understanding, in terms of resilience, that coherence is found at the centre of physical, mental, emotional and spiritual dimensions [14]. There are various HeartMath techniques used for helping to overcome traumatic experiences, and improving physiological coherence, sense of coherence and resilience [19, 20, 21, 22, 23].

Methodologically, case studies can be qualitative, and were one of the first qualitative methodologies used [24], quantitative, or both [25]. They are typically used in the social sciences and for practice orientated areas [24]. Case studies are a naturalistic design [26]. They can be intrinsic (a new phenomenon), instrumental (broader understanding) or collective (multiple case studies simultaneously,

which is even broader) [26, 27]. Case studies are guided by the study aim [28]. They can be utilised to develop interventions and evaluate programmes [29]. They are used to understand mechanisms and links [24, 26]. They can be exploratory (the what), explanatory (cause and effect relationships) or descriptive (describe phenomenon in its context) [26, 28, 30]. Case studies are in-depth [26], focusing on both depth and breadth [28]. Information can be collected in various ways, for example, via interviews or questionnaires [28, 29]. They provide rich interpretation of data [31].

HeartMath intervention case studies have included: a case study on hypertension, physical exercise and psychophysiological coherence biofeedback [32], heuristic psychological case study of HeartMath practice for health and physical exercise [33], case study on integral life practice intervention for physical exercise and health promotion [34], empirical and heuristic phenomenological case study of the HeartMath Global Coherence Initiative [35] and health psychological case study of high intensity, low impact, physical training program [36].

Following on from an initial quasi-experimental study [1] on a HeartMath intervention, focusing on coherence, resilience and faith following a trauma where quantitatively, there were significant post intervention positive improvements in physiological coherence, and improvements in resilience and faith, and, qualitatively, positive integrated thematic changes in experiences of sense of coherence, resilience and faith, understanding the underlying mechanisms for such relationships was important [24, 26, 37]. The aim of this case study was therefore to evaluate selected participants' experiences of these areas before, during and after a HeartMath intervention to identify causal, correlation and relationship mechanisms of change. The main objective was to provide feedback

to participants and the wider scientific community on a HeartMath intervention and faith following a traumatic experience, which could have practical theological, in general, and specifically pastoral care and counselling implications.

## II. METHOD

### Design

Framed within Wilber's [38, 39, 40, 41] integral approach, a case study design, involving qualitative research methods and techniques, was utilised.

### Sample

From an original purposeful sample, of 10 participants who had been through a traumatic experience, five purposefully selected participants were chosen, two females and three males, with a mean age of 40.40 and standard deviation of 11.37, based on their willingness to discuss the HeartMath intervention in depth, including their experiences of sense of coherence, resilience, faith and HeartMath, before, during and after the intervention, as well in more detail their experiences of the HeartMath intervention, to observe the process of change. Their demographics were as follows: participant 2 (female, 54 years), participant 3 (male, 39 years), participant 5 (female, 29 years), years), participant 9 (male, 30 years) and participant 10 (male, 50 years).

### Intervention

The original intervention included experiential learning of: 1) resilience, 2) the inner battery, energy draining and energy renewing situations, and depletion to renewal grid, 3) physiological coherence, sense of coherence and intuition, and 4) HeartMath techniques [19].

### Questionnaire

Post-intervention, a questionnaire, with the following questions, were completed: Describe your experience of sense of coherence: 1) before, 2) during and 3) after

the intervention? Describe your experience of resilience: 1) before, 2) during and 3) after the intervention? Describe your experience of faith: 1) before, 2) during and 3) after the intervention? Describe your experience of HeartMath: 1) before, 2) during and 3) after the intervention? Describe in more detail your experience of the HeartMath intervention?

### Analysis

The qualitative data was coded and analysed using thematic content analysis, as this was identified as the most credible method of analysis for the data in this study, which essentially refers to a method of studying and analysing the meanings of communications in a systematic and objective way [42]. Thematic content analysis is not bound in a pre-existing theory [43]. It is about identifying and analysing patterns in qualitative information [44, 45, 46]. It can include various stages and steps. Following reading and re-reading the information, the process involved: 1) capturing words and phrases and noting their consistency through frequencies, 2) based on consistency and emergence, grouping these words and phrases into sub-themes, 3) condensing these sub-themes under higher order themes, 4) checking that the higher order themes and sub-themes reflected the transcripts, through consensual validation by participants and external researchers, and 5) interpreting the information in the discussion. For credibility, together with the thematic analysis, ATLAS.ti, a qualitative data analysis computer software package, was also utilised and word clouds created, with integrated themes and sub-themes.

### Ethics

Ethical clearance was obtained from the University of Pretoria (T013/19). Participant information was provided to each subject and consent was obtained from all participants. Participants were free to withdraw from the study at any time.

Participants were allocated a participant number to ensure anonymity and confidentiality. Consent forms, quantitative data and qualitative information were kept separately. Necessary consent to use the scales was sought and obtained. This research was undertaken via permission from the Institute of HeartMath.

### III. RESULTS

#### A. Experiences of Sense of Coherence

**Participant 2: Before:** Coherence: you are not really thinking in an orderly manner and jumping to conclusions that are not necessarily the right decisions. **During:** Coherence: enables you to calm down be more rational and consider the situation in a more holistic manor and not make rash decisions. **After:** Coherence: more in control of your situation and definitely calmer feeling of inner strength.

**Participant 3: Before:** Weak and inexperienced, never really gave much thought to it. **During:** Steadily understanding my level of sense of coherence in the beginning of the intervention, it was at a low level. Growing stronger during the experience. **After:** Experience at the end was a lot more positive, as I had been able to develop and understand the various techniques and how to apply them to have a positive impact during the intervention. Coherence to me felt like a much higher, positive and stronger result than in the beginning.

**Participant 5: Before:** My sense of coherence was not as good as it could be. Depending on the situation I would get thrown out of thought and not have the patience to refocus and tackle the current situation on hand. **During:** As I did the sessions during the intervention, I was able to build my understanding on how your feelings and breath and focus of positivity can boost your ways of dealing

with events in life. **After:** Stress can still take over but when the day comes to an end and I remember to breath and think of positive thoughts I can get back to being at ease.

**Participant 9: Before:** Never really considered in this context – to me related more to verbal or written sentences and making sense. **During:** A state of calm and mental quietness/focus. **After:** As above.

**Participant 10: Before:** Through prayer, affirmations and yoga practice receiving a sense of calmness, energy and feeling connected with people around me – at work and socially. **During:** An induced calmness and mindful increase of optimism and energy. Being at ease with myself and the world around me. **After:** Experience contentment – things seem to make sense or gel somehow. Improved acceptance maybe. The mind, body and spirit connecting in a natural way. I believe that my capacity for empathy and compassion has expanded. I also play out my signature strengths more. I would venture to say that I feel more values driven as opposed to goal driven when I experience and connection.

The following integrated sense of coherence themes and bracketed sub-themes emerged. **Before:** lack of coherence (weak, inexperienced, didn't think much about it, thinking not orderly, jumping to conclusions, would get thrown off course, had difficulty refocusing, not as good as it could have been), change (was more about thought and written logic), coherence (yoga, affirmations, energy, feeling connected to others sense of calmness, prayer). **During:** improving (low soc is growing), management (not being rash, be more rational, holistic thinking, build understanding of feelings, understanding soc, mental quietness/focus, induced calmness, breath and positivity can increase management of events), sense of coherence (increase in energy, enables you to calm down, state of calm, at ease, increase in optimism).

**After:** improving (much higher, positive, much more positive, stronger coherence), management (as above, thinking positive thoughts, remember to breath), sense of coherence (things make sense, things gel, more in control of situation, can get back to being at ease, calmer feeling of inner strength, contentment, more acceptance, core strengths, more values than goal driven, more compassion, more empathy, and mind, body and spirit connecting). **Sub-themes Categorised into SOC areas of Comprehensible, Manageable and Meaningful** – before: comprehensible (n = 1), manageable (n = 4) and meaningful (n = 2); during: comprehensible (n = 4), manageable (n = 4) and meaningful (n = 5); after: Comprehensible (n = 4), manageable (n = 6) and meaningful (n = 9). **Mechanisms of Change:** remembering to breath, can get back to being at ease, mind, body and spirit connecting, more compassion, and contentment.

### B. Experiences of Resilience

**Participant 2: Before:** Resilience: it depends on the mood you take on could be one of anger or maybe sadness even joy. **During:** Resilience: because you calm down and breathe, so to speak, you become more focused on the type of mood need to be taken and that expresses the type of resilience you need to take. **After:** Resilience: this comes from the inner strength and the thought out manor on how to handle a situation whether you need to take a step back or get involved.

**Participant 3: Before:** Weak and inexperienced, never really gave much thought to it. **During:** Steadly understanding my level of resilience in the beginning of the intervention, which was at a low level. Growing much stronger during each experience. **After:** Experience at the end was very positive, as I had been able to develop and understand the various techniques and how to apply them to have

a positive impact during the intervention. Resilience to me felt like a much more positive and stronger result than in the beginning

**Participant 5: Before:** I would often get stressed or worked up about silly little situations that in the end really did not mean much. **During:** My resilience got better and stronger. **After:** My resilience is definitely stronger after the intervention.

**Participant 9: Before:** Ability to bounce back. **During:** Improved ability to bounce back. The term ‘recharged’ feels very appropriate, or ‘centred’. **After:** As above.

**Participant 10: Before:** Mindful and motivated to take on challenges. **During:** I seem to feel recharged after a 5 min breathing (HFB) and sometimes also more relaxed in terms of life’s uncertainties – almost like it’s okay to let things go a bit or at least slow things down. **After:** Increases my psychological energy and motivation to take on more challenges. Recover quickly when feeling drained. I seem to connect with my clients in a different way because I recharge more effectively.

The following integrated resilience themes and bracketed sub-themes emerged. **Before:** low (weak, inexperienced, didn’t think about it much), internal and external stressors (depends on mood, anger, sadness or joy, stressed over little situations), bounce back (bouncing back, mindful/motivated for challenges). **During:** learning (understanding level of resilience), coping (focused on mood, okay with uncertainty, let things go, slow things down, breathe, centred, calm down), growth (gotten better, growing much stronger during experiences, stronger, improved ability to bounce back, recharged, recharged after HFB). **After:** learning (as above, thought through situation management, understand), coping (apply and develop techniques, techniques positive impact), growth (stronger, definitely stronger, inner strength, recovery quickly when

drained, connect differently with clients as can recharge more effectively, more positive, very positive, psychological energy/motivation to take on challenges). **Mechanisms of Change:** understanding level of resilience, recharged after heart-focused breathing, improved ability to bounce back and recovery quickly when drained.

### C. Experiences of Faith

**Participant 2: Before:** Faith: more than likely not the first emotion you would turn to depending on the situation. **During:** Faith: balances out any type of emotion you experience making you feel grounded. **After:** Faith: is at the forefront of the decision or situation, the power to have faith in yourself and connect as one and accept how to handle any situation whether it be good or bad.

**Participant 3: Before:** Fair, could have been stronger at that point before the intervention. **During:** Fair, however it did grow much stronger as I experienced more of the positive feedback from the intervention techniques used. I did feel that I was developing in faith and experiencing more positive and closer relationships. **After:** I feel that my faith had grown and that I had developed a stronger and more fruitful relationship with the Lord.

**Participant 5: Before:** I had had my faith in the Lord. **During:** My faith got refreshed and warmed my heart. **After:** My faith remains strong and special to my heart.

**Participant 9: Before:** Belief in religion or something that you cannot explain. **During:** See above – I feel like faith is not really the right word – improved feeling on ‘oneness’ but I would separate this from ‘faith’. **After:** As above.

**Participant 10: Before:** Acceptance of God’s grace and his presence in some way and form in my life. Contemplating how I could be of service in some form or shape. **During:** I was aware with a sense of peace and appreciation. Thoughts of grace

and humility was present for me. **After:** A subtle shift in terms of self, other and God awareness. Feeling open to listening more as opposed to performing more. A feeling of acceptance and contentment. Might be related to a feeling of “integration”.

The following integrated faith themes and bracketed sub-themes emerged. **Before:** struggle (not the first emotion to turn to, something unexplainable, fair, could be stronger), understanding (belief in religion), belief (being of service, had faith in the Lord, God’s grace, God’s presence). **During:** struggle (fair), understanding (oneness rather than faith), growth (balances emotions, makes you feel grounded, more positive/closer relationships, humility, warmed my heart, grace, appreciation, peace, got refreshed, grew stronger with techniques, developing in faith). **After:** understanding (as above, have faith in oneself), lived experience (faith remains strong), belief (integration, connect as one, acceptance, contentment, at forefront of situation, at forefront of decision, special to my heart), growth (more open to listening, accept how to handle situations, faith has grown, subtle shift in terms of self, other and God awareness, stronger/more fruitful relationship with the Lord). **Mechanisms of Change:** awareness, integration, connectivity, and special to and warmed the heart.

### D. Experiences of HeartMath

**Participant 2: Before:** I had no experience of HeartMath before intervention, so it was an unknown. **During:** I then had the opportunity to experience HeartMath intervention which in the beginning was a little difficult to control your breathing and feel the connection to your heart, but with more practice and concentration the results were fantastic. **After:** After intervention, there is definitely a more calm rational way of thinking and expression feelings.

**Participant 3: Before:** Inexperienced

before HeartMath products and techniques used, had heard of it but never tried. **During:** Steadily getting use to the equipment and enjoying the positive feedback from the use of the techniques and equipment. **After:** Experience at the end was fantastic, as I had been able to develop and understand the various techniques and how to apply them to have a positive impact during the intervention.

**Participant 5: Before:** I battled to get my breathing calm and be able to stop and refocus on the matter at hand. **During:** It was exciting to see how breathing could help your HeartMath and focus. **After:** I often need to remind myself to breath. I work better when you plan set regular sessions to not forget and fall out of focus.

**Participant 9: Before:** None. **During:** A positive tool to quantify and assist in improving mental health and wellbeing. **After:** As above.

**Participant 10: Before:** Just heard about it – no knowledge of it. **During:** Positive and energy creating. A mindful practice. Bio-feedback very useful. Some of the practices will need more time for me. **After:** Definitely effective. The idea of coherence works for me. Experienced beneficial stress relief when managing many stressors. Also changes in my mood (more optimistic) and also more mindful of what I can control and what I can not. A letting go experience. A release if you will. Bio-feedback very useful but do become aware of a performance element – a “how can I reach the higher levels?”

The following integrated HeartMath themes and bracketed sub-themes emerged. **Before:** no experience and coping struggle (no experience of HeartMath, struggled to calm breathing). **During:** learning through practice (getting use to the equipment, controlling breathing and connecting to heart initially difficult, some of the practices will need more time for me, mindful practice), positive

experiences (positive, bio-feedback very useful, enjoying positive feedback from equipment, enjoying positive feedback from techniques, positive tool to quantify mental health and well-being, positive tool to improve mental health and well-being, seeing breathing helping HeartMath, seeing breathing helping focus, with practice and concentration fantastic results, energy creating). **After:** insights (as above, mindful of performance element, more mindful of controllables, coherence idea fits, develop and understand techniques), positive application (apply techniques positively, fantastic, definitely effective, relieves stress from many stressors, calmer thinking, letting go, improves mood, express emotions calmer). **Mechanisms of Change:** experiential practice, positive bio-feedback, positive tool to improve mental health and well-being, relieves stress, letting go, energy creating and improves mood.

### E. Experiences of the HeartMath Intervention

**Participant 2:** Depending on the type of situation that you deal with, HeartMath gives you the ability to control an outcome in a positive way, and be more wise to decisions. It helps you become more in tune with the type of energy that you project, which then reflects on the surroundings.

**Participant 3:** This was an amazing experience and the end result is a positive healthy outcome, with many benefits. I try use the methods I have learnt as often as I can on daily basis to continue the positive growth across resilience, coherence experiencing a stronger faith along this journey. At times what I thought of would have a negative score rather than a positive, however from the experience I now know what positive thoughts will make my experience of coherence, resilience and faith stronger.

**Participant 5:** The intervention taught me a lot. It's an experience that can be briefly described in words but best

understood when experienced yourself. Its amazing how something as simple as breathing and focusing your thoughts can get your mind to change into positive focus, reduce stress, and help you be ready for the next step.

**Participant 9:** I feel that in terms of coherence and resilience HeartMath is very effective and helpful. It took me around 2 months to really make sense of HeartMath and really maximise the benefits. I have found it something that I can apply without biofeedback which is immensely helpful i.e. when driving etc. Using a metronome has really enhanced my experience also. Ultimately able to be significantly more focused when needed and recharge better and separate out feelings from experience. It has also made sure that I at least give myself 10 minutes a day to recharge. I feel like there has been a large focus on faith in this study, and I feel like from a semantic perspective I maybe do the study a disservice by my interpretation of faith. From a subjective and experiential perspective I feel that the intervention has improved my sense of oneness with the world and connectedness, but I do feel this differs from faith – I also find the word ‘spirituality’ quite vague and non-descriptive but I feel that would be a better term and in that sense I would say that this has been very helpful from a spiritual perspective. Furthermore, I feel that the benefits spiritually are quite secondary rather than primary, in the sense that the way I view the world is potentially slightly different (getting angry and frustrated less, feeling more present and responsive to situations and people) whereas the experience of being in coherence, whilst feeling peaceful and calm and aware does not have the same spiritual meaning or intensity that Wim Hof breathing or other techniques do, which in my experience I have found Wim Hof breathing to have a very significant effect that I would be more

likely to describe as spiritual.

**Participant 10:** Effective in establishing a sense of calm and readiness to learn by actively engaging with my environment. I do believe it stimulates the vagal nerve areas – exercising my autonomic nervous system so to speak. Providing me with more clarity of thought and optimism. I did get a sense that my coherence scores go up if I am a bit more physically active as opposed to being too relaxed. I could also notice that distractions impact my “wave” - more spiky when interrupted. Also noticed high coherence figures at times (the graph) but seem to struggle sustaining it and not really figuring out how my breathing changed as to cause it – maybe more practice, maybe a different thought, maybe a different posture – not sure. Making me think of doing more and practicing more. There was times that the bio-feedback triggered my need to figure out new ways to improve the coherence numbers - with different techniques other than the ones provided – looking forward to experiment in the future.

The following integrated HeartMath intervention themes and bracketed sub-themes emerged: spirituality (Wim Hof breathing more spiritual than coherence, helped spirituality), experiential learning (needs to be experienced, two months to really make sense and maximise benefits, stimulates vagus nerve, exercise autonomic nervous system, experimenting with what works, distraction affects coherence, metronome helped, physical activity enhances coherence, can apply without biofeedback, more practice on sustaining coherence needed, using methods as often daily), goals (thinking of doing more, thinking of practicing more), positive experience (amazing experience, taught me a lot, many benefits, simplistic yet so effective, depending on situation can positively control outcome, more responsive to situations, positive reflected in surroundings, learning from environment,



more focused, more clarity of thought, more wise with decisions, know the positive thoughts for strength, can separate feelings from experiences, less angry, less frustrated, established sense of calm, more present, in tune with energy projected, given self time to recharge, recharge better, more optimism, more responsive to people, improved connectedness, positive health outcome, effective for coherence, effective for resilience, continuing positive soc/resilience/faith growth). Mechanisms of Change: stimulates vagus nerve, exercise autonomic nervous system, metronome helped, established sense of calm, given self time to recharge, recharge better, positive health outcome, helped spirituality and continuing positive soc/resilience/faith growth.

#### IV. DISCUSSION AND CONCLUSION

Case study results revealed the following emerging mechanisms of change. For *experiences of sense of coherence*, this was relational in terms of: separate and combined increases in SOC comprehensible, manageable and meaningful areas, and focus on the following: breathing, being at ease, mind/body/spirit connecting, greater compassion and contentment. For *experiences of resilience*, this was relational in terms of: understanding resilience, techniques leading to recharging, improving bounce back and quicker recovery. For *experiences of faith*, this was relational in terms of: awareness, connectivity, integration, remarkability and heart-warming. For *experiences of HeartMath*, this was causal in terms of: experiential practice, positive bio-feedback, letting go, creating energy, improving mental health specifically mood and reducing stress, and enhancing well-being. For *experiences of HeartMath as an intervention*, this was causal in terms of: stimulating vagus nerve, exercising

autonomic nervous system, a metronome helping, establishing a sense of calm, giving oneself time to recharge, recharging better, positive health outcomes, aiding spirituality and continuing positive SOC/resilience/faith growth. Lastly, this was correlational in terms of sense of coherence sub-themes including resilience and faith, resilience sub-themes including sense of coherence and faith, and faith sub-themes including sense of coherence and resilience.

Understanding these causal, correlational and relationship underlying mechanisms of change [24, 26, 37] was credible from a theoretical and practical perspective, and the results demonstrate the value of case study research. Based on the integrated themes and sub-themes, theoretically, the results, as evident in the initial study [1], again attested to the three theological areas of spirituality, religion and faith [47, 48], as well as coherence, resilience and faith [49], being inter-related and overlapping. They supported the correlation from the initial study [1] where various Sense of Coherence Scale items [50] were correlated with the Brief Resilience Scale items [51] and the Santa Clara Strength of Religious Faith Questionnaire items [52], and there were inter-related and overlapping experiences of sense of coherence, resilience and faith integrated themes and sub-themes. This study also supported previous HeartMath intervention research on psychophysiological coherence [21, 53, 54, 55], sense of coherence [53, 54, 56, 57] resilience [21] and spirituality [53, 54]. HeartMath is a more modern approach to healing trauma, which complements long standing spiritual, faith and religious practices. It is noted that, depending on the environment, context and setting, cognitively orientated approaches might be preferred by some and others might struggle with the biofeedback complement of HeartMath. This case study has worth in terms of the areas of both HeartMath, and

pastoral care and counselling interventions. The next recommendation would be an appreciative inquiry to evaluate HeartMath as a pastoral care and counselling intervention.

### ACKNOWLEDGEMENTS

The authors would like to thank Rollin McCraty, the Director of Research at the HeartMath Institute. This work is based on research supported by the Institute of HeartMath, the University of Pretoria (UP) and the University of Zululand (UZ). Any opinion, finding and conclusion or recommendation expressed in this material is that of the authors and UP and UZ does not accept any liability in regard thereto.

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## BIOGRAPHIES



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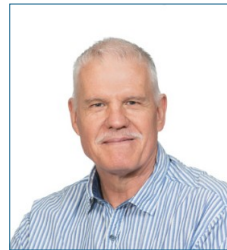
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