Nature-based Regenerative Healing: A case-study of interpersonal ecotherapy

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Abstract

This is a longitudinal case study of the successful application of an ecotherapeutic healing model referred to as "Nature-Based Regenerative Healing" that was used to assist a seriously ill individual recuperate and return to a normal life. This model emphasizes the critical components of 1. memorizing poetry and 2. repeating affirmations that are individually designed to reshape "emotion concepts" while 3. walking daily in 4. the natural world. Prior to the beginning of the treatment this individual was off work for approximately 1.5 years and had lost hope that she would ever return. She had been seen by many medical specialists and naturopathic doctors over the proceeding three years and had been consuming six antibiotics per day for nearly 1.5 years to treat Lyme disease (and its co-infections). Three main symptoms were addressed during the study: brain fog, short-term memory limitations and cognitive dysfunction involving attention-deficit and inability to maintain focus. The ecotherapy model was also used to treat other behaviors such as anxiety, procrastination, perfectionism, low self-confidence and over-thinking, that may have been further weakening her immune system. Significant improvements in the major symptoms were achieved in the first three months and the subject returned to work within six months. By ten months, the subject described herself as being "a different person", enjoying her life and her job more so than before she was first ill. Findings from various research studies such as epigenetic expression, neurobiology, molecules of emotion, perception and belief, movement and, most importantly, the influence of the natural world are woven together to help explain why the model appeared to work.

Keywords: nature-based, ecotherapy, regenerative, healing, courageous gradualism, perception and belief

Introduction

Healing is a universal, all-encompassing and continuous condition of the human psyche. To be born homo sapien is to require lifelong healing in the sense of mental, physical, emotional or ecological needs. Paramount in this list is the role that emotion plays in healing. Pert (2003) first pointed out that emotions are molecules, that is to say, all molecules in the human body are governed by and influenced by emotion. Our emotions stimulate peptides which are "messenger molecules" carrying information from cell to cell/gene to gene throughout the whole body (Chopra and Tanzi, 2016). The theory of constructed emotion (Barrett, 2017) postulates that the brain constructs emotion based on past lived experiences over time plus the sensory feedback it receives from the current experience: emotion strengthens brain connections. In the current study it is argued that if we can reshape these "emotion concepts" by disciplining the mind with the assistance of the healing properties of the natural world, we can influence our own healing.

It is also argued in this study that a disconnect with the natural world is often at the heart of the need for healing in the midst of the modern world's mainstream emphasis on constant economic growth and production. This industrial model has created a constant stress and wounding of the relationship between humans and the natural world resulting in a need to regenerate and relocate the human psyche. Thus, the goal of ecotherapy should be to "experience the healing power of nature" (Joseph, 2014, p.56) by connecting people with nature during the healing process involving physical and mental illness (Chaudhury and Banerjee, 2020).

Materials and methods

This article is divided into two parts: a/ a description of an original ecotherapeutic healing model referred to as The Nature-based Regenerative Healing (NBRH) model; b/ a description of the use of this model to aide in the successful healing of an individual suffering from a debilitating modern illness/disease.

a/ The Model

The model consists of six different phases (Figure 1): a. Brain Processing b. Regenerative Interpretation c. Barometric Adaptation d. Altered States of Mind e. Reciprocal Whole Healing and f. External Influences; and two context: Natural World and Movement.

The first phase of Brain Processing is the starting point for the model. This is the way that the brain normally works, influencing the mind that influences the body which

then influences the brain creating a reciprocal relationship between the brain, mind and body. Brain processing occurs primarily at an unconscious level, however it can be influenced at the conscious level through careful and artful mindfulness i.e. by shaping the way the brain works through deliberate and well-planned intervention. The phase of Mindful Regenerative Interpretation is composed of three sub-phases: a. Courageous Gradualism, b. Meta-Perception and c. the Regenerative Now Bubble. This phase begins the process of retraining the brain to reconceptualize perception in order to perceive healing differently. The outcome hopefully of all this is to create altered states of mind involving different ways for the brain to look at itself. The primary mechanism of the model to achieve this is through what is called Courageous Gradualism. The individual has to experience success in order for the healing process to begin. Many people who have experienced illnesses have been involved with the medical system for some period of time and may not be satisfied with the attention and results of that allopathic system. Often they may become very discouraged perhaps even depressed with the lack of success this model often achieves. Therapeutic models need to turn this around so that any small improvement becomes the primary motivator to want to heal. It's that spark to want to heal and grow through a collective of small successes.

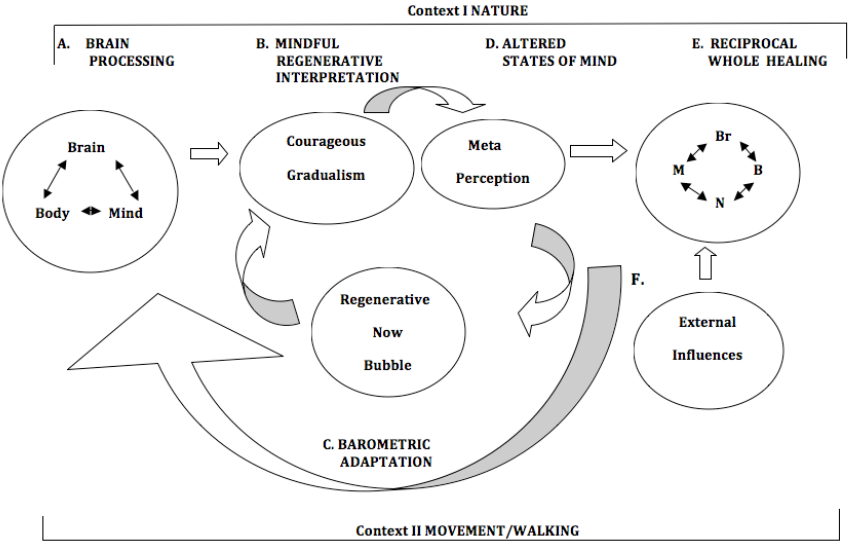

Figure 1. The Nature-based Regenerative Healing Ecotherapeutic Model

In the NBRH model this primarily occurs through the context of walking, specifically

in natural settings with as little human influence as possible (more will be said about movement and the natural world later). The individual starts walking a distance and time that they are able to easily accommodate. Whether that is 30 seconds or 30 minutes depends upon the individual. Whatever the starting point is, 30 seconds to one minute per day every day are added on, going further each successive day. It's the incremental gradualism of the walking that is important. This is referred to as courageous gradualism because at some point the individual will need to will themselves a little bit further each time than they thought they were capable. Incremental gradualism is designed to "sneak up on" the brain so it doesn't even notice the increase.

The Regenerative Now Bubble involves visualizing stepping into a bubble during the healing process and keeping out anything that detracts from this healing. This sub-phase involves living continuously in the Now Moment in a sustained manner, while eliminating all the factors that impinge upon the promotion of regenerative interpretation by the brain, of messages being generated from the brain/mind/body processing. The future and the past and all the fears, anxiety, expectations and regrets that they represent are not part of this now bubble. Allowing chronic stress to build up can elevate the production of hormones which may have a harmful effect (e.g. cortisol) which impede the healing process. This regenerative bubble provides the conditions in which living is reduced to a singular purpose: healing. External influences will attempt to force the individual to exit the bubble from time to time. Resisting these negative external influences is a constant. During the daily walking sessions, the individual is occupied with two main undertakings: memory work and affirmations.

Memory work involves memorizing poetry while walking in outdoor settings, ideally in a location with less urban influences and cleaner air. Each day, the participant verbally and repeatedly practices one-two lines of new poetry as they walk. The level of difficulty of the poetry is initially assigned by the ecotherapist dependent upon the health of the individual and the improvement that the individual demonstrates day to day.

Affirmations are also repeated out loud during these walks. The advisor develops a positively stated affirmation that is specific to the need of the participant. These sayings are always situated in the present moment rather than in the future e.g. "I am a healing walker" or "I am a healthy walker" depending upon the current state of healing; "I am surrounded by beauty"; "I accept setbacks and will keep moving forward towards optimal health". Each new affirmation is repeated over and over and

is added to the daily walking list along with all the accumulated poetry which is continuously and cumulatively repeated. However all of this is done in an incremental manner similar to the walking. It is dependent upon and adjusted through weekly conversations between the participant and the ecotherapist based on improvement in the healing process. Walking, memory work and affirmations are all gauged to produce only growth and success no matter how small the success. However, just as importantly the daily walking sessions and the learning of poetry emphasize teaching the brain and mind to be disciplined. This discipline involves for example walking each and every day and not skipping a session because one does not feel like going out and walking, regardless of the weather conditions; and being scrupulously demanding of accuracy in reciting poetry exactly as is found in the original text, word for word and not allowing oneself the luxury of carelessness and caring less (more on the benefits of this are described in the discussion section).

The Barometric Adaptation phase takes its symbolic name from the workings of a barometer. Just as a barometer constantly monitors the flux of air pressure in a continuous manner, in the Barometric Adaptation phase the brain is trained to continuously monitor the Floating Influencing Factors. These "influencing factors" are floating in the sense that they are constantly changing within each factor and among each other, at times clumping together and at other times moving independently. They are also being adjusted through gradualism. These influencing factors each form a continuum, for example fatigue to endurance, weakness to strength, increased pain to decreased pain, cold precipitation in terms of the weather to hot and sunny, less movement to more movement, unhealthy emotions to affirming emotions, harmful external influences from undermining to helpful, internal motivation from giving up to determined, risk taking from avoidance to courage and speed from slow to faster. The participant (and ecotherapist) must contend with all these changing factors in order for optimum healing to occur. During the walking sessions, while memorizing and reciting poetry and affirmations, the participant must constantly contend with and adjust the influencing factors. This adds a degree of difficulty that once conquered may strengthen the disciplined mind exponentially.

Another component of the Barometric Adaptation phase is that of courage. There are many times along the way when the healing spark is required to provide an extra burst of energy and fortitude. At the very beginning of the process courage may be required to break the bonds of inertia and the comforting surroundings of the known in order to move towards the unknown i.e. the healing experience. There are many times during regenerative interpretation where the individual may be required to endure higher levels of discomfort and or pain in order to proceed to a higher level of

healing. The healing process is not controlled by human laws. There are no guarantees during the healing process. The future is unknown and unwritten. There will be moments, days, weeks and even months when setbacks may occur. These are the times when courage is required to continue to move forward however slowly and gradually that might be.

All of these activities and influences are designed to create Altered States of Mind. Disciplining of the mind is required in order to do whatever it takes to heal, not only during the specific healing sessions but more importantly outside these sessions during the regular day. The constant repetition of courageous gradualism at a conscious level eventually turns the learned behavior into an unconscious process that the brain does without direction. If successful, the participant becomes a new and different person as the state of mind evolves into new perspectives and practices. This altered state of mind then feeds back into Brain Processing and into the Mindful Regenerative Interpretation phase of the model, continuously creating new states of mind.

This process of healing is engaged in two specific contexts: i. Movement and ii. Nature. Walking has already been discussed above as the default mode of movement. It is chosen because the participant requires a mode of transportation that releases the mind from supervising that mode so that all the focus is on memory work and affirmations. However as long as the individual can meet this basic criteria, movement could involve many variations such as running, biking, kayaking or cross country skiing or using a wheelchair. As long as one is expert enough not to have to supervise the movement at a conscious level, any of these modes could be utilized. Voss, Prakash, Erickson, et al. (2010) demonstrated that aerobic exercise, in this case walking at 60-70% of maximum heart rate for 40 minutes daily, improves the aging brain's resting functional efficiency in higher level cognitive networking. Specifically it is argued that walking (under these conditions) promotes the integration of new neurons into existing brain networks. This study concluded that older adults showed increased connectivity to become more like younger adults.

The second and primary context is that of Nature. It is preferable that the ecotherapeutic process be conducted in natural surroundings as much as possible in order to benefit from the natural healing processes of nature (more on this in a later section), as well as avoiding the many distractions of the human constructed world.

Background of model development

The NBRH model was first constructed by the author/ecotherapist, intuitively, in healing his own serious illness. It was based on the author's own research into neurobiology (e.g. Doidge, 2007; 2016; Puk, 2012) as well as his background in researching, teaching and living ecological consciousness. Joseph (2014) points out the importance of being able to incorporate "ecological insight to the practice of psychology" in the development of ecotherapy. During this healing journey, the author, through introspection as well as field notes of the experience, extracted the components of the NBRH model from his own behaviors. However there are similarities with traditional therapeutic models. In cognitive-behavior therapy (CBT), there is an emphasis on monitoring and changing unhelpful thoughts although, unlike the NBRH model, in traditional CBT there is a limited or absent role of emotion. The emphasis is primarily on modifying thoughts, beliefs and behavior (Samoilov and Goldfield, 2000). The NBRH model is perhaps more closely aligned with the experiential and person-centred traditions with a strong emphasis on intrinsic motivation, emotion, positive regard and an empathic therapeutic relationship (Joseph and Murphy, 2012; Samoilov and Goldfield, 2000). The Now Bubble phase of the NBRH model is also consistent with the notion of mindfulness, particularly with the emphasis on developing presence i.e. maintaining a moment to moment focus, without judgement or worry about the past or future (Siegel, 2010). However the significant difference between ecotherapy and these other therapeutic models is the critical role natural processes play in the healing process.

This current study represents the first time the model was used with another person (subsequently it has been used in the healing process with other subjects, article in progress).

b/ Case Study

This article uses a case study approach to research the experiences of one participant. This approach allows for an in depth exploration (Creswell, 2009) of the Nature-Based Regenerative Healing model. Data collection focused directly on the experience and effect of the model in the bounded timeframe of one year (Creswell, 2009). One benefit of the case study approach is to study current occurrences in their contexts (Savin-Baden and Major, 2013). Since the participant was interviewed by the same person who was guiding her through the Nature-Based Regenerative Healing model, data collection was both contextual and current. By taking a case study approach, this exploration is concrete and specific; the study is bounded to one

person's experience and is therefore explored in full detail (Savin-Baden and Major, 2013). Collecting data through multiple interviews complements the case study approach by providing depth and breadth of information. In this study, interviewing took place over three sessions in order to allow reflection by both participant and researcher between sessions. Since the participant describes his or her own experience, this form of data collection values that person's perspective. Interviews can mirror interpersonal conversations (Savin-Baden and Major, 2013), allowing participants to expand on points that they feel are important and giving the opportunity for the researcher to seek further explanation on certain points. This semi-structured form (Savin-Baden and Major, 2013) maintains focus on the case - the use of the Nature-Based Regenerative Healing model to assist the participant in her healing journey - as well as the flexibility to explore elements that the participant and researcher value.

The semi-structured research questions:

1. Please explain the reasons why you chose to utilize the Nature-Based Regenerative Healing model.
2. How was your life affected by the condition you had prior to utilizing this model?
3. What limitations did you face prior to using the model (mental, physical, emotional) in various aspects of your lifestyle?
4. How have these limitations changed since using the model?
5. Has the model improved the symptoms that you had prior to the use of the model? If they have changed, could you provide details as to how they have changed?
6. On a scale of 1-10, 10 being life-altering, 1 having a severe negative impact on your life, rate the benefit you feel you have achieved by following the model?
7. How do you see the role of the facilitator assisting you during the ongoing implementation of the model? How did he help you throughout the treatment?

The participant

Jesse (a pseudonym) was a 37 year wife and mother living in Ontario, Canada. She had been diagnosed with Lyme disease (more aptly described as "multiple systemic infectious disease syndrome" Horowitz, 2013), in the prime of her life. At the time

of the study, she had been off work for 1.5 years with no confidence she would ever return (she had been ill for 10 months prior to leaving work). Her major symptoms at the time were mostly cognitive. She had problems with focusing on tasks, short-term memory retention, difficulties in comprehension and brain-fog. In other words, she could not think clearly and carry out daily decision-making easily. More generally, she was quite dispirited and afraid of her future. "So concentration, focusing, attention was horrible, mood was really bad, I would get very irritated very easily, get very anxious, just being in a haze sometimes. I was depressed, anxious, worrying about what's going to happen to me in the future, a lot of looking into the future compared to now (laugh)" (Jesse). She had been tested the month previous to the start of this study by the Neuropsychological Department in the local hospital. Her cognitive results were so poor that they said they would have to recommend to her family doctor that she retake her driving license. The report stated that they were concerned that she should not be driving under her current symptoms: "memory and processing speed were notable areas of deficit" (Neurology Services Assessment, 2005, p.1). Also at the time, Jesse was receiving treatment from various specialists including an Internist and an MD in an American clinic that specialized in treating Lyme patients. She also received treatment from several alternative medicine practitioners. She had been taking six antibiotics daily for 1.5 years as prescribed by the Lyme clinic. Although the antibiotics appeared to alleviate her joint pain, none of these various treatments were healing her cognitive impairments. She had been to the emergency department several times without any success in diagnosing her problem even though at times she begged them to consider Lyme. Her Internist often poked fun at her in what Jesse described as a condescending and mocking manner which often left her in tears. In general she found her experience to be a nightmare. She had to travel out of country to the Lyme clinic where she tested positive for Lyme and many other co-infections. All of the medications and travel out of country were very stressful on her and her family, both emotionally and financially.

The treatment

The ecotherapy treatment began in May. During the first session as Jesse was explaining the story of her illness she soon started sobbing. She had found her experience thus far horrific and demoralizing, in part because her symptoms were not improving even with intervention by many allopathic and naturopathic practitioners and because of the manner in which she had been dealt with by most of these people. She felt she had not been taken seriously and had been treated in a dismissive, sometimes sarcastic manner. The same tears showed up at the second session, more

so because of a sense of relief that someone seemed to understand her journey and cared that she should heal.

In the second session, Jesse was asked to rate how much her symptoms interfered with various aspects of her life. A score of 0 meant that the symptoms did not interfere at all and a score of 10 meant that the symptoms interfered completely (these scales were adapted from a version of the Edmonton Symptoms Assessment System Symptom Rating Scales used by the local medical profession to assess symptoms recovery). The following results demonstrated Jesse's basic status in regard to her healing journey (keeping in mind this was more than two years subsequent to allopathic and naturopathic intervention): i/ general activity 8-9; ii/ mood 8; iii/ enjoyment of life 8.

After listening to Jesse's description of her symptoms and her illness journey, a dialogue between Jesse and the ecotherapist began. This session lasted approximately 1.5 hours. Four basic goals/activities were planned for Jesse to follow each week, all based around one, meta-goal i.e. taking control of her own healing:

1. a. Incremental walking each day and progressively increasing the time and distance each day, based on Jesse's improvement and b. Creating a Now Bubble to surround her self during these walks. The Now Bubble was designed to assist Jesse in staying in the moment and only focusing on the tasks she would undertake during these walking sessions;
2. Memory enhancement: during each and every walk, Jesse was to learn lines of poetry. She was to recite out loud as she walked, the lines of the poem in order to learn them and then recite them from memory. In the first week she was assigned the first two lines of *Stopping by Woods on a Snowy Evening* by Robert Frost (Jesse lived in a rural area surrounded by bush as well as having a love of the outdoors);
3. Affirmations/Mantras: Jesse was to memorize and recite affirmations during these walks. The first two were "abundance is all around me" and "I am grateful for… (she was to insert people or things of her choosing);
4. Anxiety: Jesse admitted that she was fearful of and had significant anxiety about her health and her future. During the walks, she was to learn to repeat the following basic saying repeatedly so that it would come naturally whenever she felt anxious outside the bubble during the week: "is this thinking/worrying/anxiety helping me to heal? If no, let it go!" Goals were personalized each weekly session based on her progress and her temperament in the previous week.

As Jesse started to progress, her walking was increased by one minute per day. In

order to achieve the most benefit of dealing with her cognitive limitations, she was given more challenging poetry to memorize. *Lines Composed a Few Miles above Tintern Abbey*, by William Wordsworth, was chosen by the ecotherapist because the idiom of that day (1798) was significantly different than today's: "but hearing often times the still and sad music of humanity, nor harsh nor grating though of ample power to chasten and subdue…". This poetry required Jesse to concentrate even more and thus become more disciplined than previously. It also was chosen because of her affinity for the natural world as she walked in this setting. However, again she was only assigned that which she could handle. There were never any set targets, no set expectations as to when she would have the memorization completed, either week to week or in total. Courageous gradualism was always the unwavering predominant, therapeutic philosophy. Although there were no set targets, Jesse was always encouraged to move forward even in the face of self-doubt, discomfort , scheduling challenges or temptation to take time off these daily requirements.

Eventually the sessions branched off into behaviors that were thought to contribute to stress of any kind that might result in the production of unhealthy neuropeptides and hormones. Stress was felt to be an underlying factor in the cognitive limitations. Feelings and emotions such as anxiety, fear, procrastination, perfectionism, over-thinking and lack of self-confidence were identified from personal narrative. Affirmations were created to deal with each.

Another poem that was assigned for memorizing, *The Road Not Taken*, by Robert Frost, talks about branching roads as in "…and looked down one to were it bent in the undergrowth. Then took the other just as fair…". When the sessions began, the ecotherapist drew a picture of the road Jesse had been travelling (i.e. a road of illness). Once she started to heal, a branch road was added to the original and represented the new path she was following- the healing path. Each time she progressed through a new period of her life, branching roads were added. Jesse was encouraged to visualize these new branches and visualize the letting go of the previous road she was on so that at some point they were far in the distance and forgotten. However the branches were only added after moving through a key milestone. Targets such as "return to work" were never labeled on the new branch. This was to assist Jesse in focusing only on the present moment, not the future nor the past so that there was never any disappointment if preset goals were not reached. Jesse was also encouraged to stop using certain words such as "brain fog" and "lyme" in order to stop thinking of herself as an ill person. She was encouraged to resist labels that allopathic medicine had assigned her and rather live inside of her progress

without self-judgment and negative connotations that might impede the development of a new, more affirming identity.

The nature of the interventions

The initial interventions were assigned by the ecotherapist due to the degree of brain fog that Jesse was experiencing, as well as her own overwhelming dispirited sense of hopelessness. The specific poetry and the length of the walks were first chosen by the ecotherapist. However as Jesse's progress improved and the brain fog and depression lessened, the interventions became more collaborative in nature. Jessie started to create her own affirmations and increased her own walking time. As Buckley and Brough (2017) suggest, patients need to "perceive an improvement in health and happiness during the prescribed course, sufficient to motivate them to continue subsequently".

By the end of the first week Jesse had memorized three lines of the Frost poem and by the end of the third week she had memorized the complete poem. This accomplishment was quite inspiring to Jesse, not only because of her cognitive limitations but also because of her life-long belief (beginning with the school system convincing her in grade three that she was a slow learner) that she did not have an aptitude for learning. This accomplishment created the initial emotional key that the NBRH model might actually work. As a consequence Jesse created her own affirmation that she included in her daily walks: “This therapy is an amazing opportunity for my healing”. Jesse arrived at that observation herself. Rather than what often occurs in allopathic and naturopathic medicine, in which the doctor attempts to convince the patient of the wonderful healing properties of the medicine or therapy, Jesse was left to develop a belief in the process independently and entirely based on the progress she observed and felt in her self. The ecotherapist never predicted nor exaggerated what might result in the future. As a consequence, this self-discovered emotionally charged belief had an exponential regenerative effect on her healing. Belief based on organic progress provided her with her own sense of healing.

Results

In July after two months of treatment and weekly counseling sessions (8 in total), Jesse redid the 1-10 symptoms rating scales (zero meant her symptoms did not interfere at all and 10 meant they interfered completely. In terms of i/general activity

she now scored 3 (pretest 8-9), ii/ mood now 3 (pretest 8), and iii/ enjoyment of life now 3 (pretest 8). These scores represent quite dramatic changes in her attitudes about her life.

Subsequently she requested that the Neuropsychology Department re-administer the neurology test she had completed in April in which the recommendation to retake her driving license was made. This second assessment was conducted in July. The conclusions of the assessment report speak for themselves: "…the gains she has made in such a short period of time are quite impressive. This was particularly the case for memory… " (Neurology Assessment, July, p. 5) and that there was no longer a need for her to redo her driving test. Jesse told the Neurology Assessment examiner of her experience with the Nature-based Regenerative Healing Model. Jesse was encouraged to continue to work with it "because whatever it (the NBRH Model) is doing seems to be working" (Jesse). This objective assessment conducted by neurology specialists provides a compelling description of the improvement she had made since starting treatment through the Nature-based Regenerative Healing process. Nothing else had changed in her life other than beginning this model. The medications and alternative therapies she had received over the previous 1.5 years had no discernible positive effect in her cognitive healing.

Given this progress, the next goal was to improve cognitive functioning enough so that a return to work in the fall was possible. The level of difficulty of the memory work was increased by memorizing additional poetry by Wordsworth. This was assigned by the ecotherapist as it compelled Jesse to focus even more intently on memorizing exact words and phrasing. As well, we started to focus on stressful behaviors that create harmful neuropeptides and hormones that might impact brain healing. Conditions such as procrastination, anxiety, perfectionism and poor self-concept were each addressed by creating affirmations that would reduce these behaviors and replace them with healing ones.

Jesse returned to work part-time in November and gradually increased the number of hours and days she worked per week until the end of January when she returned to work full-time. From Jesse's point of view, this was something she never thought she would be able to do again. She progressed from a place of depressing darkness to now one of hope and self-confidence.

At the one year anniversary since beginning the Nature-based Regenerative Healing journey, Jesse described herself as a "different person". She stated that she enjoyed her job more now than before she became ill, she was a more confident, happier,

calmer and less anxious person. Symptoms of her Lyme illness were now quite minor and less often.

Analysis: Multiple Perspectives

Why did this model appear to assist Jesse in her healing? What changes might have been occurring within Jesse, physically and emotionally? Is it possible that Jesse is a "different" person? What current theories might help us to understand the reciprocal relationships between perception and outcomes?

Initial success

The speed at which Jesse showed improvement over the first two months may be due to three factors: a/ Jesse's will to become a healthy, whole person again and rejoin the normal activities of life including a job, raising a family and engaging in social relationships. Because of the dark, hopeless, lonely experience she had been through, Jesse was desperate to find someone who took her seriously and find a system that was "holistic" in its approach to healing. "One person, a specialist, wouldn't see me, because I didn't have a positive Lyme test… to the point where I'd even call the office crying I need to see him for five minutes. It seemed so lonely because the medical community didn't really believe me, so that was lonely" (Jesse); b/ her trust in the ecotherapist. When asked why she chose to partake in this ecotherapeutic model, her response was because "just hearing your [the ecotherapist's) story"…"and that you had success with it" [Nature-based Regenerative Healing Model]; c/ the principle of courageous gradualism in the model.

Discussion: Epigenetic expression, restructuring neuropathways and disciplining the mind

Epigenetic expression

One area of research that might provide some answers to the above questions is that of epigenetic expression. Although studies in this area are tentative, it is believed that experience changes the manner in which our genes express themselves (Lipton, 2006). Methyl markers attached to every gene can influence the function of the gene differently than how it had functioned previously. Although this has long been

thought to occur over slow "evolutionary" speed, there is mounting evidence that our genes may be able to change their expression based on real time experiences (Black and Slavich, 2016; Buric, Miguel, Jong, Mee and Brazil, 2017; Tang, 2017). Thus the constant repetition of affirmations that Jesse said out loud to herself during her daily walks in nature, 80 minutes of highly disciplined and initially very desperate focus per day (plus utilizing these affirmations during the rest of the day whenever a corresponding situation presented itself) for one full year may have helped her to change the way in which her genes responded. By constantly telling her brain that she was a more confident person, a capable person, a compassionate person, a healthy person, and many more similar affirmations, she came to believe what she heard. That coupled with objective feedback in terms of improvement as well as the perception of reduced symptoms convinced Jesse that she was healing. This self-reinforcing dynamic may have been able to change her epigenome, helping her to perceive herself as being a "different person".

Neurobiology

A second perspective to explain Jesse's healing progress is that of neurobiology, specifically neuroplasticity (Doidge, 2007; Schwartz and Begley, 2003; Wexler, 2008). Deliberate, targeted thought can physically alter the neuronal structure in three ways: 1. new neurons are formed 2. new connections (synapses) between neurons are formed resulting in new neuropathways and 3. the myelin sheath that surrounds and insulates each neuron and that transmits the electrical current, is thickened and strengthened (Coyle, 2009). Jesse was creating new neuropathways in the brain by the daily repetitive memorizing and reciting of challenging poetry. Initially she had to push herself i.e. her brain, to make this adjustment. Even though the adult brain is "plastic" (i.e. malleable), post-puberty a kind of "neurorigidity" (Puk, 2012, p.6) sets in.

Certainly neural networks and cognitive processing in adults can still grow but the change is often modest. The overall effect of neurorigidity is "conservative" (Wexler, 2008, p.60). In adults, small changes are done "so grudgingly with a lot of effort and self-discipline in comparison to the effortless experience of the child's brain and mind" (Puk, 2012, p.6).

The daily intense repetition of the model compels the brain rewire itself at an

accelerated rate. In short order Jesse's brain appeared to make the adaptation required and began to develop these interconnections of neurons more easily and more rapidly and improved the speed at which the electrical current passing along the thickened myelin sheath carried these messages. At the same time she was expanding this network, she was allowing the brain to naturally disconnect other, unhealthy neuropathways with her beliefs such as "I am an ill person", "I am will never get better", " I am not a very capable person", "I am afraid of the future", and many more. Most of these brain pathways were quite worn in after years of daily reinforcement. By ceasing to think these things (or at least not dwelling on these unhealthy messages) and replacing them with counter affirming beliefs, the brain would "synaptically prune" (Blakemore and Firth, 2005, p.113), disconnect or minimally weaken these connections to the point that Jesse's brain would automatically cease to focus on them - to the point that we may be able to suggest she did become a "different person".

Molecules of emotion

A third explanation for the successful implementation of the healing model involves the chemical make-up of emotions and our ability to influence the type of chemical that is stimulated through mindful discipline. Pert (1997) first laid out the role that emotions have in transforming the body by either creating disease or healing it. From her findings, she concluded that emotions are chemicals, specifically neuropeptides, which are "mechanisms for activating neuronal circuits, throughout the brain and body" (p.145). Every cell in the body receives and transmits information to all other cells. Pert believed that a "psychoimmunoendorine system' (p.171) integrated the brain, the immune system and the endocrine system into one interconnected process. Barrett Feldman (2017) has demonstrated that emotion is "constructed" by the brain as it synthesizes emotion concepts created from past experiences and linked to current experiences. Through the constant repetition of positive affirmations, Jesse was influencing the circulation of chemical molecules that may have had a healing effect throughout her body. She avoided the production of harmful emotion-stimulated chemicals by disciplining her mind to quickly let go negative emotion to the point that constructing affirming emotion became an automatic subconscious process.

Perception and belief

If we accept that there is no reality outside of the one the brain interprets and creates, healing primarily is a matter of perception and belief (Lipton, 2006). The concept of the "placebo effect" is often used to explain the mysterious manner in which ill people heal even though they may be taking a substitute medication that has no medicinal capacity. In clinical trials, deception is often associated with this phenomenon (Kuby, 2013; Miller and Kaptchuk, 2008). From the allopathic perspective, the "placebo effect" means failure in that healing occurs in spite of the fact that there is no drug involved. However the concept of "the conviction-based healing effect" is presented here as a more apt description of this phenomenon in that at no time was there ever any deception present between Jesse and the ecotherapist. Jesse perceived/interpreted that she was getting better based on her gradual success in walking further, memorizing poetry and emphasizing affirmations. The way she viewed her progress created a belief that the model worked and that it would help her heal. Her belief then changed her perception e.g. that she was no longer an ill person. This constant reciprocal feedback loop reinforced itself to the point that changes became real and permanent. Her epigenome was constantly "bathed" in this affirming influence. Supportive neuropathways became permanent and the production of healthy molecules of emotion became a subconscious process. The "regenerative" component is essential to understanding how the NBRH model is thought to work. Even though Jesse followed the advice of the ecotherapist who was utilizing the model, Jesse had to do the "work" herself. Unlike the interventions of allopathic and naturopathic systems that provide external "solutions" that do all the conscious work (e.g. medicine, surgery and herbal supplements), Jesse had to learn how to employ the regenerative ability of her brain, mind and body to "self-heal" through conviction. She had to learn to discipline her own mind on a daily basis. She healed because she believed she was healing!

Movement

The bipedal evolution of homo sapiens lead to the natural outcome of movement being an essential component of human health. The effects of regular exercise have long been shown to benefit many aspects of human physiology. As the Voss, Ruchika, Prakash, et al. (2010) study demonstrated, walking has a direct impact on the functional efficiency of "high-level cognition". In the current study being able to memorize complex poetry was assisted by the daily walking Jesse was doing, eventually settling at 80 minutes per day at her optimal heart rate.

Ecopsychology: Influence of the natural world

Jesse did her daily walking on a quiet rural country road (enclosed by forest and bush) through all seasons. Her emotional connection to the natural world was strengthened from this experience as she developed a deeper appreciation or "ecophily" (Puk and Stibbards, 2011; Puk, 2021) towards the flora, air quality, shapes of clouds, weather patterns as well as the landscape. The quietness of the natural surroundings also provided Jesse with the opportunity to develop a quiet and peaceful connection between her brain and her surroundings and to impede constant and negative "rumination" that is often associated with chronic stress (Bratman, Hamilton, Hahn, Daily and Gross, 2015; Kaplan, 1995). This also allowed her to intensify her focus on memorizing poetry and believing affirmations. Walking inside the "now bubble" in the natural world allowed her to leave the daily stresses behind, lighten her mood and become one with nature. Her brain was able to "relax" in the welcoming natural world from everyday worries, similar to the "vacation effect". There is also evidence that natural settings provide healthier surroundings through embodied experience (Puk, 2021). In a healthy forest, trees act as large filters capturing dust and toxic chemicals as well as emitting aromatic phytoncides which kill germs and increase oxygen levels (Wohlleben, 2016). Many benefits have also been shown when adults spend time walking through forests, including a lowering of blood pressure, an improvement in lung capacity, elasticity of arteries and increased relaxation (Song, Ikei and Miyazaki, 2016). Natural processes also stimulate the production of neurotransmitters critical in the healing process (Selhub and Logan, 2012), particularly those stimulated by the sun (Mead, 2008). Thus, the more natural the setting, the more conducive it may be to the ecotherapeutic walking context of the model.

Demand Characteristics

Demand characteristics are potential cues in the research study that might influence the responses of the participants (Allen (Ed.), 2017). For example, the subject might want to please the ecotherapist/researcher by providing responses that the subject believes the ecotherapist/researcher is looking for. This can be challenging in a qualitative study in which the responses of the subject generate the perceived results.

In the current study, these demand characteristics were mitigated by a number of external inputs that confirmed Jesse's responses and helped to validate the results of

the study:

1.The diagnostic testing done by the independent neuropsychological hospital department before the current study commenced (as described above), compared to the same tests conducted three months after the ecotherapy had begun, demonstrated a significant improvement in Jesse's condition.
2. Her family doctor, who was about to recommend removal of Jesse's driver's license prior to the commencement of the current ecotherapy study, assessed that Jesse had improved significantly enough from the NBRH model that he reversed his decision.
3. When Jesse returned to work, she was closely monitored by her immediate supervisor and the director of the organization. Her return was characterized by increasing the number of days a week that she worked based on her progress. During this time, she had to meet with the public on a regular basis, oftentimes providing information that the clients did not want to hear.
4. The American Lyme clinic that had been treating Jesse concluded that they no longer needed to do so. She eventually stopped taking all antibiotics.

Limitations

1. Some of the interview questions might imply to the subject that they should benefit from the model and therefore they might be reluctant to respond in the negative, especially to the ecotherapist. More balanced questions might be desirable.

2. In clinical trials the placebo effect is often viewed as a negative. In utilizing the Nature-Based Regenerative Healing model I view the subject's placebo effect, if it occurs, to be one component in a set of healthy, interconnected interventions including the natural world, movement, ecotherapist and the regenerative capacity of the human body. Miller and Kaptchuk (2008) suggest that the concept of the placebo effect would be better served by reconceptualizing it as "contextual healing", "that aspect of healing that is produced, activated or enhanced by the context of the clinical encounter" (p. 224).

3. Although this case study involved the healing process of a serious illness, further application with individuals who have post-concussive symptoms, depression, chronic pain and those who do not have defined illnesses but rather wish to improve their overall well-being, may demonstrate its utilitarian role in human healing.

Conclusion

The success of the Nature-Based Regenerative Healing ecotherapy model in this case study may be due in large part to what Jesse referred to as its "holistic nature". This model impacts all aspects of human healing including physical, cognitive, emotional and ecological, simultaneously; rather than the often isolated, narrowly-defined, atomistic approach of allopathic medicine. In this study, natural processes and human emotion were inseparably interwoven in Jesse's healing journey.

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