

Review

Cultivating Well-Being through the Three Pillars of Mind Training: Understanding How Training the Mind Improves Physiological and Psychological Well-Being

Andrew Villamil ^{1, †, ‡, *}, Talya Vogel ^{2, †}, Elli Weisbaum ^{3, †}, Daniel J. Siegel ^{4, †}

1. Pepperdine University/ University of California, Los Angeles, 24255 Pacific Coast Highway Malibu, CA 90263, Malibu, USA; E-Mail: Andrew.Villamil@pepperdine.edu
2. PGSP-Stanford Psy.D. Consortium, 1791 Arastradero Road Palo Alto, CA 94304, Palo Alto, USA; E-Mail: talyav@stanford.edu
3. University of Toronto, Institute of Medical Science, Medical Sciences Building, 1 King's College Cir, Toronto, ON, Canada; E-Mail: elliweisbaum@gmail.com
4. Mindsight Institute, 1137 2nd St #202, Santa Monica, USA; E-Mail: dan@drdanie siegel.com

‡ Current Affiliation: Pepperdine University, Mindsight Institute

† These authors contributed equally to this work.

* **Correspondence:** Andrew Villamil; E-Mail: Andrew.Villamil@pepperdine.edu

Academic Editors: Sok Cheon Pak and Soo Liang Ooi

Special Issue: [Health Benefits of Meditation](#)

OBM Integrative and Complementary Medicine
2019, volume 4, issue 1
doi:10.21926/obm.icm.1901003

Received: October 3, 2018

Accepted: January 7, 2019

Published: January 17, 2019

Abstract

Research on the physiological and emotional health benefits of meditative practices has grown exponentially over the last two decades, influencing both scientific literature and popular media. Research has highlighted three distinct components or pillars at the core of meditative practices and mind training. They are, focused attention, open awareness, and



© 2019 by the author. This is an open access article distributed under the conditions of the [Creative Commons by Attribution License](#), which permits unrestricted use, distribution, and reproduction in any medium or format, provided the original work is correctly cited.

kind intention. Neuroimaging studies and recent research highlight that the repeated practice of directing attention and awareness can enhance neural connections, and turn momentary mindful states into more enduring mindful traits. Most meditative practices typically only engage one or two of these elements, and there has been no identified meditative practice that integrates all three pillars that we are aware of, except for a concept referred to as the “Wheel of Awareness”. The Wheel is a practical framework for understanding and practicing mindful awareness, and is unusual because it engages all three pillars in one practice, shaping how energy and information flow from one component to the next one. Through conscious practice individuals can improve the ability to observe and reflect on the mind, increasing the ability to monitor and modify neural networks, which in turn modulate physiological responses within the body. Further research is proposed to further understand the neurobiological underpinnings behind repeated practice, including longitudinal studies monitoring neuroplasticity and activity in establishing new neural connections and synaptic changes.

Keywords

Neuro-Psychology; mindfulness; interpersonal neurobiology; meditation; wellbeing; health; clinical interventions; healthcare; psychology

1. Introduction

Research on the physical and mental health benefits of mindfulness meditation, along with other meditative practices, has grown exponentially over the last two decades, influencing both scientific literature and popular media. Within the last six years, the number of journal articles published yearly on the topic of mindfulness has doubled, with 692 publications in peer reviewed journals in 2017, up from 300 in 2013 [1]. With the increasing popularity and public awareness of mindfulness, there has been a growing concern - both from within and outside the mindfulness community - that popular media portrays meditation as a “universal panacea” for a broad range of conditions [2]. There are critiques that “meditation” and “mindfulness” are not defined clearly enough within the literature, as there are a wide variety of contemplative practices from a range of ancient practices, such as from the Buddhist tradition that are included within the formal practice of “meditation” [2, 3]. This broad use of the term “meditation” may contribute to exaggerated claims about the impact of its practice, and fails to account for the current research linking particular types of meditative practices to specific benefits [4, 5, 6]. The phrase, “where attention goes, neural firing flows and neural connection grows” [7], emphasizes the neural reality that how attention is focused in specific ways with particular practices, will stimulate different areas of the brain to grow [8]. In *Altered Traits*, Goleman & Davidson discuss this issue and note that the term “meditation” has been used as a catch-all word for myriad varieties of contemplative practice, just as sports refers to a wide range of athletic activities. For both sports and meditation, the end results vary depending on what you actually do [4]. Recent research has moved away from a broad discussion of the benefits of meditation, and has instead focused on the unique neurological and health benefits of specific meditative practices. Broadly speaking, a

meditative practice creates a temporary, intentionally cultivated mental state. With repetition, the specific *state* of neural firing can lead to neuroplastic changes, such that a baseline change in neural structure and functional connectivity then becomes the basis for a new *trait*. This is how specific meditative practice induces states that can become long term traits in individuals [4, 7].

Research on meditation has highlighted three mental elements that can be considered the core of meditative practices that cultivate states of integration and ultimately traits of healthy living. Other elements of practice may be demonstrated in the future to be important as well, but at this moment the research literature has identified these as common foundational components [5]. These include the training of (1) focused *attention*, (2) open *awareness*, and (3) kind *intention* (or what is alternatively called loving kindness or compassion) [7]. Attention, awareness, and intention can be viewed as foundational elements of the mind [9, 10]. This review will discuss these three types of meditations that are currently most commonly studied within research as Focused Attention Meditation (FAM), Open Monitoring Meditation (OMM), and Loving Kindness Meditation (LKM). In this way, a systematic practice of cultivating these mental elements can activate a specific state that with practice can change their baseline functioning, altering the traits of the individual. These three areas of practice can be referred to as the “three pillars” of mind training [7] (see Figure 1).

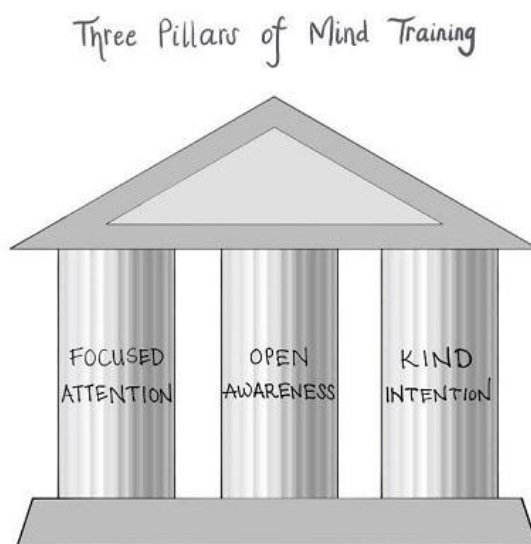


Figure 1 Illustration used with permission by Madeleine Welch Siegel from *Aware*, © 2018 Mind Your Brain Inc.

Interpersonal Neurobiology (IPNB), a cross-disciplinary approach to exploring the science of human behaviour [10], views the three pillars as complementary to one another as each train the mind in an interrelated way [7]. In the ongoing discussions of what “mindfulness” itself means, some include kindness as an essential component of what being mindful entails, yet others include the training of this state of positive regard to others and oneself as a separate training distinct from mindfulness practice. Because of this disparity in consistency of definitions in the field [4, 11, 12], we will use the parsimonious term, “mind training” to refer to the set of practices that include the three pillars. Beyond merely an issue of semantics, this broader term reminds researchers,

clinicians and meditation practitioners that training the mind includes very specific components and that the specificity of outcomes claimed is shaped by the specificity of the practices themselves. In line with this growing body of research, this review will use the three pillars of mind training as a framework to explore the unique benefits, neural underpinnings and examples of practices found within the broad spectrum of meditation. While there are meditation practices that may not fall within these three pillars, such as Transcendental Meditation [13], referring to each of these practices individually is beyond the scope of this paper. The current review will highlight the potential power, scope, and impact of training these three pillars to cultivate both personal and interpersonal well-being.

2. Pillar I: Focused Attention

Focused attention refers to the ability to maintain one's concentration, manage distractions by letting go of them when they arise, and refocus attention on the original object of attention [7, 14]. In meditative practices, focused attention meditation (often referred to as FA or FAM) is taught by using a specific element - for example the breath - as an anchor toward which to purposefully direct attention. Studies of meditation practices that are based on focused attention have reinforced the concept that intentionally guiding the flow of energy and information can improve communication between structures in the brain [3, 15, 16]. For example, a study by Brewer and colleagues found increased connectivity between posterior cingulate, dorsal anterior cingulate, and dorsolateral prefrontal cortices both at baseline and during meditation in experienced meditators [17]. Attention training enables the practitioner to strengthen how attention is focused, sustained, and redirected with a distraction [3, 5, 15, 18]. In this way, attention can be viewed as involving a range of networks in the brain that shape how energy and information are directed and sustained.

An example of focusing attention as a meditative practice is the Focused Attention Meditation (FAM). FAM is a popular meditative practice that utilizes focused attention on a chosen object (e.g., a candle) or event (e.g., breathing) [3, 5, 15]. A common example of focused attention practice involves focusing one's attention on the breath, becoming aware of when the mind wanders or becomes distracted, and then gently guiding one's attention back to the original object of attention.

In a practice referred to as the "Wheel of Awareness" [7], the experience of knowing or being aware is placed in a *hub* of a metaphoric wheel. The various potential objects of attention, the "knowns" of consciousness, are placed along the *rim*. In this way, a visual image of a *spoke* of attention is directed from the hub of awareness to the rim of the knowns (see Figure 2). In the first of four segments of the rim are the first five senses - hearing, seeing, smelling, tasting and touching. Each sense is the focus, sequentially moving attention to the next sensory stream and letting the prior one go. Then the spoke is moved to the second segment and the various internal bodily sensations, ranging from the muscles, bones, and internal organs, such as the intestines and heart, become the objects of directed attention, one by one. Focused attention on each of these external and internal senses help develop this first pillar of mind training.

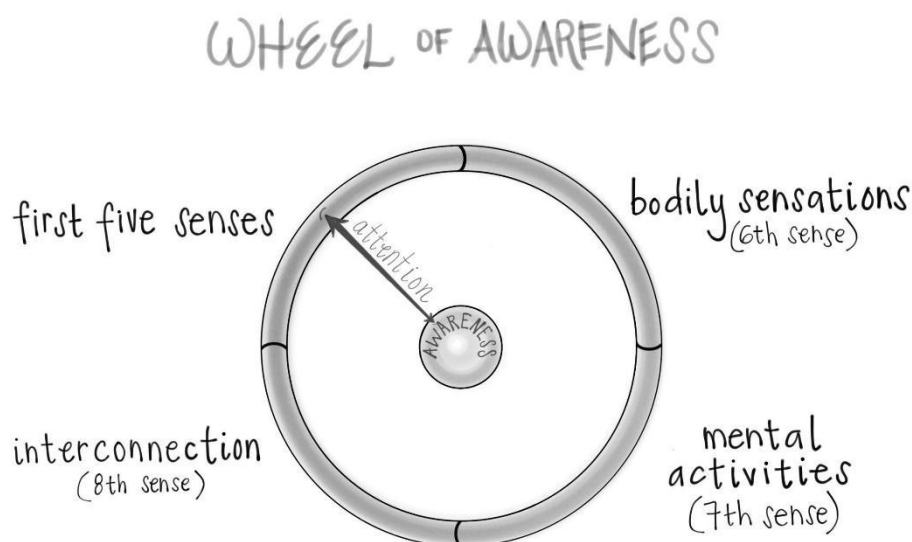


Figure 2 Illustration used with permission by Madeleine Welch Siegel, in *Aware*, © copyright 2018, Mind Your Brain, Inc.

The mind as a regulatory process can be seen to have both the monitoring and the modifying components, each of which can be strengthened with mind training [7, 19]. The focus of attention builds the skill of “monitoring” so that energy and information patterns are detected with more stability and therefore more depth, focus and detail [3, 4, 15]. This directed attention shapes the subjective experience of the mind by allowing the individual to alter where attention goes in the present moment and which energy streams enter awareness. The repeated practice of focused attention improves the focus from an intentionally created state during practice to a more generalized capacity as an enduring trait that likely involves neuroplastic growth in the brain [4]. Overall, the creation of an enduring trait that cultivates healthy functioning may involve the regulatory circuits of the brain. Regulation may depend upon the linking of differentiated regions—a process that can simply be called “integration” [10]. In the view of interpersonal neurobiology, neural integration is the basis of well-being and enables an integrative state to become an integrative trait, a foundational characteristic of the individual that may generalize across contexts. For example, establishing a healthy physiological response to distress would be to take steps to immediately regulate the body’s autonomic functions, such as respiration, which can help an individual focus on the present moment. That focusing would then enable somatic and mental states to enter an integrative flow of being interpersonally more receptive and flexible, reinforcing the inner physiological and mental state of balance with a relational sense of connection. In this way, we can see the mind as both an embodied and relational process [10]. Meditative practices that strengthen the mind and cultivate integration may impact the well-being of an individual in both the embodied and relational facets of the mind.

Focusing attention on the breath helps to diffuse the lower brain region’s response to threatening stimuli [5, 15, 20]. By recruiting the limbic regions, along with cortical circuits of the

brain, an individual can establish a sense of awareness that facilitates the process of emotional regulation [4, 7]. Stabilizing attention helps an individual see with more clarity, focus, depth and detail. With such stabilizing of the mind's monitoring capacity, the modulation component of regulation can then be more effectively engaged. A study that used a neurophenomenological approach, combining fMRI neurofeedback and first-person reports of subjective experience, found correlations between meditator's self-reported subjective experience of "undistracted awareness" to correspond with posterior cingulate cortex (PCC) deactivation, while participants' subjective experience of "distracted awareness" corresponded with PCC activation [5, 21]. These findings shed light on the workings of the *default mode network* (DMN) and suggest that meditation can have a direct impact on our ability to monitor and modify mind wandering [21]. Such research demonstrates that focusing attention improves neural integration and may lead to increased well-being among individuals who practice regularly.

Being aware of an internal state can help an individual pause, know that state with clarity, and then modify that internal state and alter externally directed behaviours. How? When we view mental experience as emerging from energy flow, and when differentiated aspects of that flow can become linked, a more flexible state is created. Awareness enables the linkage of differentiated processes to more readily arise. In this view, neural integration of this embodied flow of energy creates a more flexible, adaptive, coherent, energized and stable (FACES) flow [19]. Focusing attention on awareness is a gateway to becoming present, linking differentiated parts, and regulating this process more effectively as it enters a state of neural integration.

By differentiating the hub of knowing (being aware) from the rim of the knowns (the object of awareness), a meditative practitioner can learn to integrate consciousness. Specific neural correlates and potential impacts of such an integrative process will need to be determined with future research. One potential is that this process, with repeating practice, could activate and strengthen regions of the brain responsible for attention and emotional regulation, such as the anterior cingulate cortex (ACC), which communicates between the limbic regions and the prefrontal cortex [5, 15, 22]. These integrative states would also enable the DMN to become less differentiated, reduce its excessive firing, and make its functions more balanced in its contribution to the brain's other networks [17].

Focusing attention can improve neural network communication in the extended nervous system as it recruits a structure like the ACC and the insula, facilitating communication between the prefrontal cortex and the limbic system, which can help facilitate emotional regulation [23]. Repeatedly strengthening focused attention through specific practices, this state of regulation can lead to an enduring trait [4]. For example, an individual who is looking to improve their response to situations in a highly stressful work environment can practice focused attention, which may lead to an increased ability to regulate emotions [24]. This research demonstrates that focusing attention leads to improved emotional responses, possibly due to enhancements in neural integration [25], and represents a foundational aspect of training an integrative mind.

3. Pillar II: Open Awareness

Open Awareness refers to a state of being receptive to objects within awareness, without getting attached to them or lost in them [7]. Open Monitoring Meditation is one example of a meditation technique that develops an individual's ability to engage in a state of open awareness.

The focus of the meditation becomes the monitoring of awareness, or the ability to recognize when thoughts or feelings arise [3, 5, 15]. In contrast to FAM, there is no specific designated object in the internal or external environment that the meditator intentionally focuses on. Rather, the practitioner expands their scope of attention to include the flow of their own perceptions, thoughts and emotions with the primary objective being the stabilization of meta-awareness [14].

In the Wheel of Awareness practice, open monitoring occurs in the third segment of the rim in which any mental activity--emotion, thought, memory, intention, belief, or other mental processes--is invited into awareness in the hub (See Figure 2). This part of the practice also invites the practitioner to focus on the characteristics with which a mental activity, the object that arises from the rim, enters the awareness of the hub. Exploring how a thought or memory first enters, stays present, and then leaves awareness, becomes a part of the learning in this stage. Even sensing the “gap” between two mental activities, such as two thoughts or a thought and a memory, helps to continue the differentiation of the awareness in the hub from the objects of attention of the rim. A more advanced step follows, with the bending of the spoke of attention back into the hub, the retracting of the spoke, or simply not having a spoke. Here, awareness is filled with the experience of being aware of awareness itself. This hub-in-hub stage of the practice enables the experience of pure awareness, which further helps practitioners integrate consciousness as they differentiate the knowing of awareness in the hub from the knowns of attention on the rim.

Once a meditator progresses into open monitoring, the goal is to remain aware of any passing experience, without attempting to refocus the mind on anything in particular [5, 3]. The aim is to *broaden* attentional focus, rather than honing attention on a specific object or thought [15, 3]. This allows the individual to practice engaging in a non-reactive experience to external and internal stimuli, and build the capacity to recognize within awareness thoughts and emotions as they arise and not become swept up into them [3, 7, 15]. Dr. Vo, a pediatrician who has adapted Mindfulness Based Cognitive Therapy (MBCT) into a program for adolescents, describes the practice of open monitoring as an opportunity to tap into one's “inner clarity”, strength and resilience - which results in an individual's ability to purposefully not be pulled away from present moment experience by their thoughts or perceptions [26]. In Wheel terms, the ability to distinguish hub from rim enables practitioners to rest in the spaciousness of awareness without becoming lost on the rim's various objects of attention.

4. Pillar III: Kind Intention

Kind intention exists as a state of mind, which embraces the cultivation of caring motivation towards all living beings. This third pillar of mind training is at the core of many meditative practices and is defined as the ability to exist in a positive, compassionate and loving (internal or external) state of mind [7]. In traditional practices, terms such as “loving kindness” or “directed compassion” are used, suggesting that our care for one another is at the crux of kind intention practices. Sharon Salzberg (2002), a meditation educator, states that loving kindness is “all about our interconnectedness,” revealing the deeply relational nature of this state of mind [7].

In the Wheel of Awareness practice, this sense of interconnectivity is cultivated on the fourth segment of the rim. Relationships with other people and the planet are explored by opening awareness to the sensations of a progressively wider set of interconnections, from local to global.

Research on the repeating of verbal statements of care and kindness has shown positive changes in physiology and behaviour [4, 27, 28]. By practicing statements of kind intention, the individual shapes the flow of energy and information within the mind by directing thoughts of loving kindness towards oneself and then towards others. This directed flow of energy is a mental process that weaves various electrical signals across the brain, linking differentiated regions together. Studies of non-referential compassion, for example, have found high gamma waves in electrical studies of brain activity revealing elevated states of the linking of differentiated areas of the brain [29, 30, 31]. Gamma wave activity is associated with mental processes such as working memory, conscious perception, attention, and learning; demonstrating coordination between neurons referred to as “synchrony” [30]. Meditative practice involving imagining compassion leads to high gamma synchrony, which researchers believe plays a vital role in the networks that integrate differentiated neural processes enabling highly coordinated and organized cognitive functions to arise and facilitate synaptic growth, and demonstrates improvement in neural integration [30]. Evidence from compassion and loving kindness research demonstrates that there are mechanisms that exist that alter neural connectivity [31]. These findings demonstrate that practicing loving kindness improves health and well-being. Further research is needed to understand how this process can be utilized in different populations as a form of targeted mental training [29, 32, 33, 34]

A positive stance towards one’s own inner world and the inner subjective experience of “others” (external) is the broad attitude embedded in the notion of kind intention. Compassion and positive regard are included in this state of mind, a kind of mental vector that directs the overall flow of energy and information. A hostile intention would create one set of unfolding’s; a kind intention would create a wholly different state. Compassion is a term used to refer to a mental stance concerned about the suffering of others or the self. This involves being aware of suffering and imagining how to reduce distress and carry out actions to reduce suffering [35]. This directed practice of compassion can lead to prosocial behaviour in humans and has been shown to be a significant factor in improving mental health as well [36, 37, 38]. Loving Kindness includes statements of compassion, but also focuses on the happiness and thriving of others. Such positive states invite a focus on empathic concern and empathic joy; for example, being able to care about the mental experiences of others and also rejoice in their health and success. In this manner, loving kindness, compassion, and positive regard are collectively subsumed under the broad term, kind intention. A concrete example of the impact that this kind of practice can have on prosocial behaviour is seen through studies that look at the effect of loving kindness practice on our mind’s distinction of in- and out-groups. A six-week control trial with three conditions: 6-week loving kindness practice, 6-week lovingkindness discussion and waitlist control showed decreases in implicit bias against stigmatized outgroups. The reduction was observed only in the lovingkindness practice condition, implying that loving kindness meditation can reduce automatically activated implicit attitudes towards stigmatized social groups [39].

When kind intention is practiced, individuals are able to build prosocial behaviour through empathy, compassion and kindness. This practice recruit’s areas of the brain that maintain health and support individual well-being, while simultaneously providing support toward the well-being of ‘others’ and all living beings [7, 36, 38]. Ultimately, kind intention is about the care and concern for well-being within and between. Directing compassion by guiding energy and information flow towards all living beings influences electrical activity in the cortex. Recent research also

demonstrates the movement of energy throughout structures in the body innervated by the vagus nerve [7, 36, 38, 40]. In addition to high gamma wave activity across regions of the brain, the vagus nerve, the largest cranial nerve, is likely recruited during kind intention meditative practices. Also known as the pneumogastric nerve, the vagus nerve is a component of the parasympathetic nervous system, influencing functions of the heart, the lungs, and as far down as the digestive system. Research shows that the vagus nerve is activated by individuals who practice compassion and engage in prosocial behaviour [36, 38, 40]. Kok & Fredrickson (2010) demonstrate that prosocial behaviour is cultivated through kind intention and leads to higher vagal tone. Studies show that individuals with higher vagal tone experience significant health benefits [28, 36]. For example, higher vagal tone leads to better overall cardiovascular health, reduces levels of inflammation throughout the body, leads to stronger emotional and social connections, and improves emotional regulation [28, 36, 40, 41]. In these ways, loving kindness can improve gastrointestinal processes, pain management and cardiovascular risk factors [40, 41]. Improving vagal tone can lead to health benefits, such as better heart rate variability (revealing enhanced balance of parasympathetic and sympathetic inputs to heart rate), and lower blood pressure. [28, 36, 41-43].

While distinct practices have been shown to activate and strengthen different areas of the brain [8], in practice the three pillars serve to reinforce the functions of each other. Therefore, it should be considered that while each of the three pillars can be defined separately, they may be most effective when used in relation to one another. Being able to strengthen the focus of attention, for example, may be best carried out with kind regard when the mind wanders. Opening awareness is facilitated by being able to sense how to move attention away from an object of focus and into pure, receptive awareness. This distinguishes the experience of being aware from the object within awareness; cultivating a kind stance or a state of kind intention, can be facilitated from a state of acceptance and being wide open in awareness.

Having a positive regard, sense of purpose in being of service to others, and kind intention optimizes the enzyme, telomerase, which repairs and maintains the ends of the chromosomes, enhancing cellular health and longevity [32]. Research notes that the intense cultivation of focused attention may also lead to such changes [44]. Additionally, being open to what is happening as it is happening (i.e., presence) may also reveal how such mental presence cultivates cellular health [32, 45, 46]. Such research demonstrates how each of the three pillars may participate in a common physiological improvement, the optimization of telomerase.

Though it may be hard to distinguish which of the three pillars is the active agent of change, three-pillar training overall can be said to create positive changes in the health of the body. Such changes include an overall reduction in stress [47], improvements in immune function [48-50], reduced inflammation [51, 52], reduced cardiovascular risk factors through increased vagal tone [43], and a decreased rate of cellular aging as suggested by Blackburn and Epel (2017). Further, studies suggest that three-pillar practice increases the functional and structural integration in the brain. For example, examining the brains of long term meditators, studies have found increased connectivity in the corpus callosum, which links differentiated left and right hemispheres [53], increased hippocampal volume [54], and increased cortical thickness within the prefrontal cortex [55]. In addition, studies of the interconnected networks of the brain called the “connectome” reveal that these practices also lead to a more functionally and structurally interconnected connectome [17, 20, 52, 56, 57]. These results demonstrate that strengthening our capacity for

focused attention, open awareness, and kind intention is an integral part of improving physical and emotional health and well-being. This three-pillar mind-training approach provides an empirically supported way to create meditative states that can transform into long-term positive traits in our individual and collective lives.

5. Discussion

5.1 The Wheel of Awareness: A Practical Example in Applying the Three Pillars

The Wheel of Awareness is a reflective practice which integrates all three pillars into a single meditation based activity. The original concept of the Wheel of Awareness as a singular practice was to integrate consciousness by differentiating and then linking its components. Consciousness can be seen as having at least two facets -- the knowing of being aware and the knowns of what one can be aware of [7, 19]. By differentiating awareness in the hub from the objects of awareness on the rim, the visual metaphor of the Wheel became a useful model for visualizing aspects of the mind, and specifically how to integrate the experience of consciousness. This practice was designed based on the Interpersonal Neurobiology notions that integration is the basis of well-being and that consciousness is needed for change in such processes as education, parenting, and psychotherapy [7, 10, 58, 59]. By differentiating the knowing of awareness from the knowns of consciousness, metaphorically placing awareness in the hub and the range of entities and processes that can be the focus of attention along the rim, the Wheel of Awareness offers a unique practice that integrates consciousness by systematically linking these differentiated knowns of the rim to the knowing of the hub. Focused attention is cultivated along the first two segments of the rim. Open awareness is developed on the third segment aspect of the practice, including the bending of the spoke enabling awareness of awareness to be experienced. Kind Intention, the cultivation of a kind regard and awareness of the interconnections of life, is developed along the fourth segment practice of the Wheel. In these ways, this reflective practice derived from scientific reasoning and clinical practice utilizing the lens of Interpersonal Neurobiology overlaps with the three pillars derived from ancient contemplative traditions. This is an example of a consilient finding [60] in which independent pursuits have overlapping findings. Future controlled studies will need to establish the empirical support for the clinical and workshop case reports of significant improvements in well-being with the practice.

Another unique feature of the Wheel of Awareness is that it offers one approach that combines each of the three usually independent elements into one single practice. While research on each of the three pillars that comprise the Wheel has been carried out with individual contemplation-derived practices, future studies will be needed to support the implication of these findings that doing all three pillars in one regular practice such as the Wheel also leads to the improved physiological, psychological, and relational health of distinct practices.

In addition to the positive outcomes of the individual pillars and the potential synergistic effect of combining them into one integrative whole, the Wheel has some interesting academic and theoretical implications regarding awareness and the human mind. The reports of a subset of a large (10,000 individuals) study of workshop participants who offered first-person accounts of the experience of doing the Wheel have provided useful data points for illuminating the subjective experience of both rim and hub elements of the practice [7]. By then attempting to coordinate

those common findings across cultures and educational backgrounds of participants experiencing this science-inspired integration of consciousness practice with potential views of the nature of mental life, new insights into the origins of consciousness and the therapeutic power of the ability to cultivate presence in an individual's life have been possible [7].

6. Conclusions

Mind training involves practicing meditation regularly. There is not yet consensus about minimal duration needed, but some suggest regular is better than irregular, and perhaps about a dozen minutes a day is potentially a minimal duration [18, 61]. Most research shows that, if practiced daily, an individual can begin to alter neural connections within eight weeks, creating a mental state of well-being that is primed to become a long term, altered trait [4]. In this way, the active state created in a practice becomes a positive shift in state that will then become generalized and engaged throughout non-practice times. Neuroscience research highlights that the three pillars of focused attention, open awareness, and kind intention promote neural network activation and linkage in different regions of the brain depending on the type of meditation being used, and can be seen as essential components for training the mind. Future findings may reveal other pillars that are foundational for strengthening the mind. Each individual pillar likely provides distinct benefits in linking differentiated regions of the brain leading to improved overall health and well-being while shaping how energy is transmitted across connections within the central nervous system, the body as a whole, and perhaps even in connecting an individual's internal state to that of others through empathic and compassionate communication. As energy and information flow is shaped and the experience of being present in life is reinforced, these differentiated regions of the brain become activated and each pillar may reinforce the others. With practice, these differentiated regions can grow neural connections that are then linked together, leading to improved neural integration and activity within the individual and enhanced interpersonal connections in the person's relational life.

Research on the three pillars suggests that each one complements each other and perhaps in a singular practice, may even be found to have a synergistic effect. Three-pillar mind training supports well-being in the body, the brain, relationships between the individual and others, and modulates the capacity for regulating attention, emotion, thought, and memory. Taken as a whole, the mechanism for training the mind follows the neuroscientific concept, "where attention goes, neural firing flows, and neural connection grows." Combining all three pillars into a regular practice can be studied in future research to confirm the impression that it leads to positive regulatory changes that may arise from increased neural integration in the brain and relational integration in the connections of individuals to the social and natural world surrounding them. Through an integrated and integrative approach that combines all three pillars, discussed here through the Wheel of Awareness practice, it may be possible to alter interconnectivity between a wide set of regions of the brain in a manner that benefits long term health and well-being. Practice can promote neural integration, enhancing how individuals feel in their daily lives and how the physiological processes within their bodies support health.

Research on both the mind and mind training is still in its emergent stages. Further research is needed to more fully understand the long-term benefits of how three-pillar practices and other mind training strategies may support the mechanisms of a healthy mind. For example, future

studies on the Wheel of Awareness practice and its long-term effects would provide more answers about the benefits of daily practice that combines all three pillars into one approach. Additionally, neuroimaging studies while practicing the individual pillars sequentially in a simultaneous exercise, such as the Wheel, could provide data on interactions among regions of the brain, and demonstrate what is occurring through each step of the exercise. Another area of inquiry could be to explore whether the order in which this type of Wheel practice is conducted is essential to producing health benefits. Can the framework of the Wheel be used as a targeted clinical intervention for specific disorders? Are there modifications to the three-pillar approach that need to be tailored to given clinical conditions? There are many exciting ideas and mechanisms of growth to explore. Thus far, the research on these three pillars of mind training implicates mind training as a potential mechanism to enhance individual and collective health across a spectrum of neural, physiological, inner and interpersonal processes of well-being. These results demonstrate that when engaging with three pillars of mind training, energy and information flow may be cultivated toward states of integration that become traits of health.

Acknowledgments

Author would like to acknowledge Madeleine Welch Siegel, Mary Hargis, Alan Castel, Julio and Stefanie Quiceno, Anthony and Linda Calciano, Brian Betz, Barshen Habelhah, Ryan Mckeithan, whose work helped inspire and support this work.

Author Contributions

Andrew Villamil authored the article, abstract, integration of Neuroscience research and practice, health benefits, and edited. Talya Vogel authored the introduction, and edited. Elli Weisbaum edited, and did mindfulness research. Daniel J. Siegel authored The Wheel of Awareness practice, ran the 10,000 individuals sample study, insight with interpersonal neurobiology perspective throughout the article and literature, and edited.

Competing Interests

The authors have declared that no competing interests exist.

References

1. American Mindfulness Research Association. Mindfulness journal publications by year, 1980-2017. Retrieved from: <https://goamra.org/resources/>. 2018.
2. Van Dam NT, Van Vugt MK, Vago DR, Schmalzl L, Saron CD, Olendzki A, et al. Mind the hype: A critical evaluation and prescriptive agenda for research on mindfulness and meditation. *Perspect Psychol Sci*. 2018; 13: 36-61.
3. Lutz A, Jha AP, Dunne JD, Saron CD. Investigating the phenomenological matrix of mindfulness-related practices from a neurocognitive perspective. *Am Psychol*. 2015; 70: 632-658. doi:10.1037/a0039585
4. Goleman D, Davidson RJ. *Altered traits: Science reveals how meditation changes your mind, brain, and body*. Penguin. 2017.

5. Lippelt DP, Hommel B, Colzato LS. Focused attention, open monitoring and loving kindness meditation: Effects on attention, conflict monitoring, and creativity—A review. *Front Psychol.* 2014; 5: 1083.
6. Lutz A, Slagter HA, Dunne JD, Davidson RJ. Attention regulation and monitoring in meditation. *Trends Cogn Sci.* 2008; 12: 163-169.
7. Siegel DJ. *Aware: The science and practice of presence.* New York, NY: Tarcher/Perigee Penguin Random House. 2018.
8. Valk SL, Bernhardt BC, Trautwein FM, Böckler A, Kanske P, Guizard N, et al. Structural plasticity of the social brain: Differential change after socio-affective and cognitive mental training. *Sci Adv.* 2017; 3: e1700489.
9. Shapiro SL, Schwartz GE, Santerre C. Meditation and Positive Psychology. *Handbook of positive psychology.* New York, NY: Oxford University Press. 2002; 632-645.
10. Siegel DJ. *The developing mind, second edition: How relationships and the brain interact to shape who we are.* New York, NY: The Guilford Press. 2012.
11. Shapiro SL, Brown KW, Thoresen C, Plante TG. The moderation of mindfulness-based stress reduction effects by trait mindfulness: Results from a randomized controlled trial. *J Clin Psychol.* 2011; 67: 267-277.
12. Shapiro SL, Carlson LE, Astin JA, Freedman B. Mechanisms of mindfulness. *J Clin Psychol.* 2006; 62: 373-386.
13. Mahone MC, Travis F, Gevirtz R, Hubbard D. fMRI during Transcendental Meditation practice. *Brain Cogn.* 2018; 123: 30-33.
14. Dahl CJ, Lutz A, Davidson RJ. Reconstructing and deconstructing the self: Cognitive mechanisms in meditation practice. *Trends Cogn Sci.* 2015; 19: 515-523.
15. Fox KC, Dixon ML, Nijeboer S, Girn M, Floman JL, Lifshitz M, et al. Functional neuroanatomy of meditation: A review and meta-analysis of 78 functional neuroimaging investigations. *Neurosci Biobehav Rev.* 2016; 65: 208-228. doi:10.1016/j.neubiorev.2016.03.021
16. Fox KC, Nijeboer S, Dixon ML, Floman JL, Ellamil M, Rumak SP, et al. Is meditation associated with altered brain structure? A systematic review and meta-analysis of morphometric neuroimaging in meditation practitioners. *Neurosci Biobehav Rev.* 2014; 43: 48-73. doi:10.1016/j.neubiorev.2014.03.016
17. Brewer JA, Worhunsky PD, Gray JR, Tang YY, Weber J, Kober H. Meditation experience is associated with differences in default mode network activity and connectivity. *Proc Natl Acad Sci U S A.* 2011; 108: 20254-20259.
18. Morrison AB, Goolsarran M, Rogers SL, Jha AP. Taming a wandering attention: Short-form mindfulness training in student cohorts. *Front Hum Neurosci.* 2014; 7: 897. doi:10.3389/fnhum.2013.00897
19. Siegel DJ. *Mind: A journey to the heart of being human.* New York, NY: W.W. Norton & Company, Inc. 2017.
20. Hasenkamp W, Barsalou L. Effects of meditation experience on functional connectivity of distributed brain networks. *Front Hum Neurosci.* 2012; 6: 38. doi:10.31231/osf.io/82ayf
21. Garrison K, Santoyo J, Davis J, Thornhill T, Kerr C, Brewer J. Effortless awareness: Using real time neurofeedback to investigate correlates of posterior cingulate cortex activity in meditators' self-report. *Front Hum Neurosci.* 2013; 7: 440.

22. Wager TD, Davidson ML, Hughes BL, Lindquist MA, Ochsner KN. Prefrontal–subcortical pathways mediating successful emotion regulation. *Neuron*. 2008; 59: 1037-1050.
23. Garrison KA, Zeffiro TA, Scheinost D, Constable RT, Brewer JA. Meditation leads to reduced default mode network activity beyond an active task. *Cogn Affect Behav Neurosci*. 2015; 15: 712-720. doi:10.3758/s13415-015-0358-3
24. Menezes CB, Bizarro L. Effects of focused meditation on difficulties in emotion regulation and trait anxiety. *Psychol Neurosci*. 2015; 8: 350-365.
25. Lapate RC, Rokers B, Tromp DPM, Orfali NS, Oler JA, Doran ST, et al. Awareness of emotional stimuli determines the behavioral consequences of amygdala activation and amygdala-prefrontal connectivity. *Sci Rep*. 2016; 6: 25826.
26. Vo DX. *The Mindful teen: Powerful skills to help you handle stress one moment at a time*. New Harbinger Publications. 2015.
27. Fredrickson B. *Love 2.0: How our supreme emotion affects everything we think, do, feel, and become*. New York: Hudson Street Press. 2013.
28. Kok BE, Fredrickson BL. Upward spirals of the heart: Autonomic flexibility, as indexed by vagal tone, reciprocally and prospectively predicts positive emotions and social connectedness. *Biol Psychol*. 2010; 85: 432-436. doi:10.1016/j.biopsycho.2010.09.005
29. Lutz A, Greischar LL, Perlman DM, Davidson RJ. BOLD signal in insula is differentially related to cardiac function during compassion meditation in experts vs. novices. *NeuroImage*. 2009; 47: 1038-1046. doi:10.1016/j.neuroimage.2009.04.081
30. Lutz A, Greischar LL, Rawlings NB, Ricard M, Davidson RJ. Long-term meditators self-induce high-amplitude gamma synchrony during mental practice. *Proc Natl Acad Sci*. 2004; 101: 16369-16373. doi:10.1073/pnas.0407401101
31. Lutz A, Brefczynski-Lewis J, Johnstone T, Davidson RJ. Regulation of the neural circuitry of emotion by compassion meditation: Effects of meditative expertise. *PloS One*. 2008; 3: e1897.
32. Blackburn E, Epel E. *The telomere effect: A revolutionary approach to living younger, healthier, longer*. New York, NY: Hachette Book Group. 2017.
33. Cohn MA, Fredrickson BL. In search of durable positive psychology interventions: Predictors and consequences of long-term positive behavior change. *J Posit Psychol*. 2010; 5: 355-366. doi:10.1080/17439760.2010.508883
34. Cohn MA, Fredrickson BL, Brown SL, Mikels JA, Conway AM. Happiness unpacked: Positive emotions increase life satisfaction by building resilience. *Emotion*. 2009; 9: 361-368.
35. Gilbert P. *The compassionate mind*. London: Robinson. 2009.
36. Porges SW. Vagal pathways: Portals to compassion. *The Oxford handbook of compassion science*. New York: Oxford University Press. 2017.
37. Weng HY, Fox AS, Shackman AJ, Stodola DE, Caldwell JZ, Olson MC, et al. Compassion training alters altruism and neural responses to suffering. *Psychol Sci*. 2013; 24: 1171-1180. doi:10.1177/0956797612469537
38. Weng HY, Schuyler B, Davidson RJ. The impact of compassion meditation training on the brain and prosocial behavior. *The Oxford handbook of compassion science*. New York: Oxford University Press. 2017.
39. Kang Y, Gray JR, Dovidio JF. The nondiscriminating heart: Lovingkindness meditation training decreases implicit intergroup bias. *J Exp Psychol Gen*. 2014; 143: 1306-1313.

40. Stellar JE, Keltner D. Compassion in the autonomic nervous system. In P. Gilbert (Ed.) *Compassion: Concepts, research and applications*. London: Routledge, Taylor & Francis Group. 2017; 120-123.
41. Stellar JE, Cohen A, Oveis C, Keltner D. Affective and physiological responses to the suffering of others: Compassion and vagal activity. *J Pers Soc Psychol*. 2015; 108: 572-585. doi:10.1037/pspi00000101111
42. Frøkjær JB, Bergmann S, Brock C, Madzak A, Farmer AD, Ellrich J, et al. Modulation of vagal tone enhances gastroduodenal motility and reduces somatic pain sensitivity. *Neurogastroenterol Motil*. 2016; 28: 592-598. doi:10.1111/nmo.12760
43. Thayer JF, Yamamoto SS, Brosschot JF. The relationship of autonomic imbalance, heart rate variability and cardiovascular disease risk factors. *Int J Cardiol*. 2010; 141: 122-131. doi:10.1016/j.ijcard.2009.09.543
44. Jacobs TL, Epel ES, Lin J, Blackburn EH, Wolkowitz OM, Bridwell DA, et al. Intensive meditation training, immune cell telomerase activity, and psychological mediators. *Psychoneuroendocrinology*. 2011; 36: 664-681.
45. Conklin Q, King B, Zanesco A, Pokorny J, Hamidi A, Lin J, et al. Telomere lengthening after three weeks of an intensive insight meditation retreat. *Psychoneuroendocrinology*. 2015; 61: 26-27.
46. Epel ES, Puterman E, Lin J, Blackburn E, Lazaro A, Mendes WB. Wandering minds and aging cells. *Clin Psychol Sci*. 2013; 1: 75-83.
47. Creswell JD, Pacilio LE, Lindsay EK, Brown KW. Brief mindfulness meditation training alters psychological and neuroendocrine responses to social evaluative stress. *Psychoneuroendocrinology*. 2014; 44: 1-12.
48. Davidson RJ, Kabat-Zinn J, Schumacher J, Rosenkranz M, Muller D, Santorelli SF, et al. Alterations in brain and immune function produced by mindfulness meditation. *Psychosom Med*. 2003; 65: 564-570.
49. Morgan N, Irwin MR, Chung M, Wang C. The effects of mind-body therapies on the immune system: Meta-analysis. *PloS One*, 2014; 9: e100903.
50. Pace TW, Negi LT, Adame DD, Cole SP, Sivilli TI, Brown TD, et al. Effect of compassion meditation on neuroendocrine, innate immune and behavioral responses to psychosocial stress. *Psychoneuroendocrinology*. 2009; 34: 87-98.
51. Creswell JD, Irwin MR, Burklund LJ, Lieberman MD, Arevalo JM, Ma J, et al. Mindfulness-based stress reduction training reduces loneliness and pro-inflammatory gene expression in older adults: a small randomized controlled trial. *Brain Behav Immun*. 2012; 26: 1095-1101.
52. Creswell JD, Taren AA, Lindsay EK, Greco CM, Gianaros PJ, Fairgrieve A, et al. Alterations in resting-state functional connectivity link mindfulness meditation with reduced interleukin-6: A randomized controlled trial. *Biol Psychiatry*. 2016; 80: 53-61.
53. Luders E, Kurth F, Mayer EA, Toga AW, Narr KL, Gaser C. The unique brain anatomy of meditation practitioners: Alterations in cortical gyrification. *Front Hum Neurosci*. 2012; 6: 34. doi:10.3389/fnhum.2012.00034
54. Luders E, Toga AW, Lepore N, Gaser C. The underlying anatomical correlates of long-term meditation: larger hippocampal and frontal volumes of gray matter. *Neuroimage*. 2009; 45: 672-678.

55. Lazar SW, Kerr CE, Wasserman RH, Gray JR, Greve DN, Treadway MT, et al. Meditation experience is associated with increased cortical thickness. *Neuroreport*. 2005; 16: 1893.
56. Doll A, Hölzel BK, Boucard CC, Wohlschläger AM, Sorg C. Mindfulness is associated with intrinsic functional connectivity between default mode and salience networks. *Front Hum Neurosci*. 2015; 9: 461.
57. Garrison KA, Scheinost D, Constable RT, Brewer JA. BOLD signal and functional connectivity associated with loving kindness meditation. *Brain Behav*. 2014; 4: 337-347.
58. Cozolino L. *The social neuroscience of education: Optimizing attachment & learning in the classroom*. New York, NY: W.W. Norton & Company, Inc. 2013.
59. Cozolino L. *The Neuroscience of human relationships: Attachment and the developing social brain*. New York, NY: W.W. Norton & Company, Inc. 2014.
60. Wilson EO. *Consilience-the unity of knowledge*. New York: Vintage. 1998.
61. Greeson JM, Juberg MK, Maytan M, James K, Rogers H. A randomized controlled trial of koru: A mindfulness program for college students and other emerging adults. *J Am Coll Health*. 2014; 62: 222-233. doi: 10.1080/07448481.2014.887571



Enjoy *OBM Integrative and Complementary Medicine* by:

1. [Submitting a manuscript](#)
2. [Joining in volunteer reviewer bank](#)
3. [Joining Editorial Board](#)
4. [Guest editing a special issue](#)

For more details, please visit:

<http://www.lidsen.com/journals/icm>