

Kinds and Dimensions of Mindfulness: Why it is Important to Distinguish Them

Dusana Dorjee

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Abstract The number of research studies on clinical aspects of mindfulness and neural correlates of meditation practices involving mindfulness is fast growing. But, what is understood as mindfulness and goals of the practice differ across traditions and studies. Clarity in conceptions and components of mindfulness is essential for interpretation of findings across studies and better understanding of the mechanisms involved. In this paper, I outline a working model for exploring mechanisms and effects of different types of mindfulness. The focus is on five dimensions of mindfulness: (1) intention and context of mindfulness practice, (2) bare attention, (3) attentional control, (4) wholesome emotions, and (5) ethical discernment. Meta-awareness and insight, as two additional factors associated with mindfulness, are also discussed. I explore the role these dimensions and factors play in the conception of mindfulness used in the mindfulness-based stress reduction program and in the traditional Buddhist context. Importantly, it is considered how the dimensions and factors of mindfulness may map onto distinct cognitive processes and neural substrates, and what the possible links between them are. This leads to a variety of research hypotheses and questions about mechanisms and effects of mindfulness. I suggest how refinement of the concept of mindfulness and sensitivity to differences across conceptions of mindfulness can lead to development of novel condition- and individual-specific treatment approaches based on meditation, and advance neuroscientific research on brain plasticity associated with well-being.

Keywords Mindfulness · Meditation · Attention · Cognitive neuroscience · Well-being

D. Dorjee (✉)
School of Psychology, Bangor University,
LL57 2AS Bangor, UK
e-mail: pssa07@bangor.ac.uk

Introduction

Over the past three decades beneficial effects of mindfulness have been documented in treatment of numerous clinical conditions from chronic pain (Kabat-Zinn et al. 1987) to depression (Teasdale et al. 1995), and eating disorders (Kristeller et al. 2006). Interest in applications and effects of mindfulness has spread across different areas of psychology including relationship counseling (e.g., Carson et al. 2004) and prison interventions (Samuelson et al. 2007). And most recently, neuroscientific studies of mindfulness emerged examining cognitive and neural changes related to attention and emotion (e.g., Goldin and Gross 2010; Jha et al. 2007). Despite this exponentially growing interest, it is far from being clear what mindfulness is, what components and mechanisms are associated with it, and how it relates to different types of meditation.

The predominant notion of mindfulness in Western psychology stems from the mindfulness-based stress reduction (MBSR) program (Kabat-Zinn 1990) and is based on Buddhist mindfulness practices. MBSR describes mindfulness as “the awareness that emerges through paying attention on purpose, in the present moment, and non-judgmentally to the unfolding of experience moment by moment” (Kabat-Zinn 2003, p. 145). Experientially, the most common form of mindfulness practice in MBSR directs individual's attention, habitually caught up in the endless flow of thoughts, judgments and ruminations, to a simple mode of observing current sensations and perceptions.

Bishop et al. (2004) proposed two main components of mindfulness in MBSR: self-regulation of attention and change in orientation towards experience marked by curiosity, openness and acceptance. With regard to psychotherapeutic mechanisms of mindfulness it has been suggested that mindfulness involves exposure to unwanted sensations and thoughts, as well as change in attitude

towards them marked by acceptance rather than avoidance, and this results in increased relaxation and improved coping strategies (Baer 2003). But despite this recent progress, the more one tries to specify how mindfulness relates to positive behavioral changes, emotional well-being and different types of attention and awareness, the less clarity and agreement there is. The field requires further refinement of the concept of mindfulness as it moves towards more focused questions about what components and mechanisms of mindfulness are responsible for its beneficial effects in specific conditions and different people (Kabat-Zinn 2003; Shapiro et al. 2006; Siegel et al. 2008).

An added level of complexity arises through fast growing research on cognitive and neural mechanisms underlying meditation as practiced both within Buddhist and more secular context (Lutz et al 2008). Here the focus is on two main types of meditation, the focused meditation (FM), in which attention is voluntarily sustained on a chosen object, and open meditation (OM) involving non-reactive monitoring and examination of mental activity in order to gain knowledge about the works of mind (Lutz et al. 2007). According to traditional Buddhist sources, mindfulness plays an important role in both FM and OM. But the Buddhist concept of mindfulness can differ from mindfulness cultivated in MBSR in many respects. Sensitivity to these differences is essential for postulation of informed hypotheses and for understanding of findings as well as their implications for basic and applied research across studies involving MBSR and mindfulness developed in Buddhist context.

Here, I aim to provide a working model for exploring mechanisms and effects of different types of mindfulness by examining five dimensions of mindfulness relevant to psychological and neuroscientific research. This leads to a number of research questions for future studies. I focus on mindfulness in MBSR and mindfulness in Theravada and Tibetan Buddhist discourse, because majority of recent research investigated practices involving mindfulness developed in these traditions. The distinctions outlined are intended to encourage further, even more detailed, examination of mindfulness across mindfulness-based approaches and Buddhist schools. I conclude with methodological recommendations for studies on mindfulness that need to accompany any theoretical attempts to refine the concept of mindfulness.

Dimensions of Mindfulness

Mindfulness in MBSR is a broad concept including attention to experience without elaboration, attentional control, meta-awareness, specific affective attitude towards, and a way of thinking about, experience, as well as

development of new coping strategies. It can be a process, a temporary mental state, or a more stable trait (Bishop et al 2004; Davidson 2010).

In majority of Buddhist schools, mindfulness (“sati” in Pali, “smṛti” in Sanskrit and “tren-ba” in Tibetan) is a faculty distinct from meta-awareness, developed in focused meditation and applied in open meditation. Even though sustaining of attention on a chosen object is the central function of Buddhist mindfulness, “right mindfulness” arises in conjunction with other mental factors mainly associated with the right view, ethical discernment and cultivation of wholesome emotions (Analayo 2006; Olendzki 2008; Wallace 1999a, b).

These descriptions of mindfulness in MBSR and in Buddhist context point to the following five dimensions: (1) intention and context of mindfulness practice, (2) bare attention, (3) attentional control, (4) wholesome emotions, and (5) ethical discernment. There are two additional factors, meta-awareness and insight, which are included as dimensions of mindfulness in some conceptions, but not others. I will now examine these dimensions and factors of mindfulness in more detail with regard to applied research and underlying cognitive and neural systems.

Intention and the Context of Mindfulness Practice

Buddhism is usually classified into three main traditions: Theravada Buddhism of Southeast Asia, Mahayana schools (in China, Vietnam, and Japan), and Tibetan Vajrayana Buddhism. Each of these traditions includes great variety of schools and lineages that further differ in their emphasis and practices (Mitchell 2002). Nevertheless, all of them share the belief that the ultimate source of suffering is an uncontrolled mind guided by anger, attachment, and ignorance. Liberation from suffering comes when the mind is freed from these forever and manifests ultimate wisdom. Buddhist mindfulness is an integral part of practices leading to liberation, but is not their final goal. It is distinct from insight and wisdom which arise from applying mindfulness to investigation of the mind from within (Olendzki 2008; Wallace 1999a, b). In Theravada, mindfulness is cultivated in the context of the eightfold path. In addition, the Mahayana and Vajrayana schools emphasize the motivation to liberate oneself and all sentient beings from suffering.

The concept of mindfulness in MBSR has its roots in Theravada Buddhism, and within this tradition it is perhaps closest to mindfulness as presented in the Burmese Buddhist school of Mahasi Sayadaw. This specific tradition was introduced in the West by Nyanaponika Thera (1962) and adopted by Western Insight (vipassanā) Meditation school. In MBSR, mindfulness is taught without Buddhist cultural, philosophical and religious background to enable

people, who otherwise would not train in Buddhist mindfulness, to benefit from the secular version of the practice. In this way, MBSR made mindfulness practices accessible to a broad range of people and it became a vehicle for reduction of suffering in various conditions (see reviews by Baer 2003 and Ivanovski and Malhi 2007). But unavoidably, some aspects of mindfulness training explicitly taught in its Buddhist version became implicit, or were not included, in MBSR. The aim of mindfulness in MBSR is to provide some relief from suffering in the more conventional sense. This can lead to better self-regulation and further exploration of the mind (Shapiro et al. 2006), but MBSR does not encompass guidance on final liberation in the Buddhist sense.

Cognitive and Neural Mechanisms

The view which motivates engagement in mindfulness training might be an important factor influencing outcomes of the practice and is closely connected to specific practices used to develop mindfulness. Motivation for and context of mindfulness are usually neglected in research, perhaps because it is difficult to relate complex cognitive attitudes of this kind to health-related outcomes and neuro-cognitive substrates. Nevertheless, this aspect of mindfulness deserves more attention in research as demonstrated by a recent study showing that Western subjective measures of mindfulness do not accurately capture mindfulness as practiced in more traditional context by students in Thailand (Christopher et al. 2009).

Questions for Future Research

Does context in which mindfulness is developed influence its cognitive and neural correlates related to attention, emotions, and decision making? For example: How does attentional and emotional processing differ between matched practitioner groups with similar amount of mindfulness practice trained in MBSR and in the Insight Meditation tradition? How does motivation for mindfulness training influence its beneficial outcomes related to well-being?

Bare Attention and Mindfulness

Attention to present moment experience has been the central attribute of mindfulness in MBSR starting with Jon Kabat-Zinn's (1990) initial descriptions up until most recent definitions (Baer 2003; Bishop et al. 2004). The emphasis on non-elaborative "bare attention" to experience is the heart of most practices taught in mindfulness courses, and usually involves shift of attention from "higher level" processing including language and thought to "lower level" sensory input such as sounds in the environment or somato-

sensory feelings. As summarized by Siegel et al. (2008): Mindfulness practice in MBSR and related approaches most often "focuses upon the sensory data itself, for its own sake" (p. 23). Some practices in MBSR, anchoring attention on basic sensory perceptions, extend the bare attention observations to the thought domain.

Buddhist writings mention a basic mental faculty of attention (*manasikāra*) described as "the initial split seconds of bare cognizing of an object, before one begins to recognize, identify, and conceptualize." (Analayo 2006, p. 59). There is an aspect of mindfulness that can be characterized as "further development and temporal extension of this type of attention" (*ibid.*). Nyanaponika Thera (1962) introduced the term "bare attention" for this aspect of mindfulness and wrote that bare attention "attends to the bare facts of perception as presented through the five senses and the mind"... it is "bare registering of the facts observed, without reacting to them by deed, speech or by mental comment" (p. 32). Training in bare attention calms down the mind and body and enables the practitioner to bring to awareness automatic and habitual responses to sensory input. These are inaccessible to awareness when mind is busy with judgments, projections and rumination.

Training in bare attention plays less prominent role in Theravada traditions other than the Burmese School of Mahasi Sayadaw presented by Nyanaponika Thera. In Mahayana and Vajrayana, the notion of bare attention is virtually absent. Here, the goal of mindfulness training is refinement of attentional control to the point where it can be effortlessly used in cultivation of wholesome emotions and investigation of the nature of consciousness—processes involving voluntarily directed elaborate thought.

Cognitive and Neural Mechanisms

Because of their focus on early stages of non-elaborative perception, it has been suggested that mindfulness practices in MBSR engage bottom-up rather than top-down functions of the mind (Siegel et al. 2008). If this is the case, enhancement of processing in early perceptual areas of the brain as a neural marker of MBSR mindfulness would be expected. Supporting this notion, initial functional magnetic resonance imaging (fMRI) research with MBSR practitioners reported increased activations in somatosensory cortical areas in response to sad video clips (Farb et al. 2010). It is possible that, as a result of continuous MBSR practice, the general mode of processing, the default-mode of functioning (Raichle et al. 2001), moves away from elaborative thinking towards focus on immediate perceptual experience, resulting in modification of the self-related awareness (Farb et al. 2007).

Unlike in MBSR, wholesome elaborative thought plays an important role in training and applications of mindful-

ness in Buddhism. Here the object of mindfulness can range from breathing or a Buddha statue, to visualization of complex sacred images. Therefore, activation of brain areas involved in mindfulness practice will to large extent depend on the form of Buddhist mindfulness training. For example, focused meditation including mindfulness training using deity images as objects resulted in dramatic improvement of processing associated with efficient use of visuospatial memory resources (Kozhevnikov et al. 2009). Overall, the more varied training of mindfulness in Buddhism may result in a default-mode of processing marked by flexible switching between the non-elaborative mode and directed voluntary inducement of wholesome feelings and thoughts.

Questions for Future Research

How does the default-mode of processing differ across expert practitioners of MBSR and Buddhist practitioners from various schools with comparable numbers of hours spent in mindfulness practice? What is the relationship between the default-mode of processing and well-being? For example, is there a combination of cognitive and personality characteristics which would predict the most beneficial default-mode of processing for particular conditions and people?

Attentional Control and Meta-awareness

While the bare attention aspect of mindfulness focuses on the content of awareness, other cognitive skills are needed to direct and sustain attention on present moment experience. For example, to sustain attention on bodily sensations one needs to be able to notice elaborative thinking and direct attention back to sensations in the body. This aspect of MBSR mindfulness involving both attentional control and meta-awareness is applied in development of metacognitive mode of processing central to beneficial effects of mindfulness in treatment of psychological conditions (Teasdale et al. 2002; Wells 2002).

The ability to sustain attention on a chosen object dominates traditional Buddhist understanding of mindfulness and is linked to the memory faculty (Olendzki 2008; Wallace 1999a). In Buddhist meditation, mindfulness is usually described as separate from, but developed in conjunction with, meta-awareness (*sampajanna*) in the focused meditation. (Please note that various terms have been used in translations of “*sampajanna*” from original Buddhist texts into English, e.g., clear comprehension (Thera 1962) or introspection (Wallace 1999a)). While mindfulness sustains and directs attention, meta-awareness monitors the meditative process, bringing to awareness distraction or dullness. Meta-awareness can be viewed as

quality control for the meditative process. Buddhist works on focused meditation (*shamatha*) in the Mahayana and Vajrayana traditions, describe nine training stages in development of mindfulness that culminate in achievement of a state of complete voluntary control over body and mind (Wallace 1999a).

Cognitive and Neural Mechanisms

It has been suggested that sustained attention, selective attention, and monitoring are the three main functions of attentional control developed in focused meditation (Lutz et al. 2008). Sustained attention is responsible for voluntary maintaining attention on the chosen object. Selective attention enables directing of attention towards the meditative object and disengagement from distractions. And monitoring brings to awareness changes in the focus and quality of attention. There seems to be close overlap between Buddhist descriptions of the attentional control aspect of mindfulness and the definitions of sustained and selective attention, whereas monitoring seems to relate to the meta-awareness faculty. Interestingly, it has been suggested that the first two functions related to Buddhist mindfulness are associated with brain systems that are distinct from the meta-awareness related monitoring, i.e., the predominantly right hemisphere fronto-parietal network for sustained and selective attention (Corbetta and Shulman 2002) and the dorsolateral prefrontal cortex for monitoring (Ridderinkhof et al. 2004). This dissociation lends support to the traditional distinction between mindfulness and meta-awareness.

In focused meditation training the development of sustained and selective attention is most prominent in the early stages, whereas meta-awareness associated with monitoring is more dominant in cognitive functioning when some stability of the first two functions has been achieved. Initial research, mostly on mindfulness practiced in the Buddhist context, supports this progression. Behavioral research documented improvement in sustained attention in novice practitioners after MBSR program and increase in alerting abilities likely related to meta-awareness in more advanced practitioners of Insight Meditation (Jha et al. 2007). In addition, fMRI data from a group of Tibetan Buddhist expert meditators indicates greater employment of sustained attention regions in expert meditators with less hours of practice (average 19,000 h of practice) than in meditators with more advanced level of expertise (average 44,000 h) (Brefczynski-Lewis et al. 2007). Finally, latest electrophysiological research suggests that focused meditation training in the Insight Meditation tradition improves sustained attention abilities as marked by decrease in variability of reaction times and increased consistency of theta-band oscillations (Lutz et al. 2009) as well as decreased amplitude of attention-related P3 components (Cahn and Polich 2009; Lutz et al. 2009; Slagter et al. 2007).

Questions for Future Research

Do practitioners of mindfulness in MBSR show a progression in improvement of attentional abilities from sustained attention to meta-awareness observed in practitioners of Insight-Meditation? Are there dissociable effects of sustained attention training and meta-awareness training on different aspects of well-being? Is there any similarity between development of attentional control in MBSR mindfulness and initial stages of focused meditation training described in the Mahayana and Vajrayana traditions?

Wholesome Emotions and Mindfulness

Wholesome emotions play an important role both in development of Buddhist mindfulness and in its application. With regard to training, “right mindfulness” arises in conjunction with a group of mental faculties related to wholesome emotions such as generosity, non-attachment, and loving kindness (Olendzki 2008). One of the main applications of mindfulness, of special importance in Mahayana and Vajrayana, is further cultivation of wholesome emotions of loving kindness, compassion, rejoicing and equanimity towards all living beings (Gilpin 2008; Wallace 1999b). Across Buddhist schools one finds a wealth of meditation practices suitable for practitioners of different levels and propensities that target directly the development of wholesome emotions.

MBSR emphasizes a specific attitude one brings into the training of mindfulness described as openness, curiosity and acceptance towards experience (Bishop et al. 2004; Shapiro et al. 2006). In the MBSR program these qualities are mostly developed in an implicit manner, as part of learning to relate to our experience in an open and accepting way. But some teachers emphasize explicit conscious attitude of kindness and compassion in the practice (Kabat-Zinn 2003; Shapiro et al. 2006). Others have suggested that qualities such as emotional non-reactivity and compassion are better viewed as common correlates or potential outcomes of mindfulness (Bishop et al. 2004, p. 235).

Cognitive and Neural Mechanisms

It has been shown that MBSR mindfulness has beneficial effects on emotional well-being (Shapiro et al. 2008). These may result from reduction in ruminative thinking, which exacerbates negative affect (Frewen et al. 2008), employment of strategies such as affective labeling (Creswell et al. 2007), and exposure to experience with an accepting attitude (Baer 2003; Shapiro et al. 2006). Most recent fMRI research on MBSR links decrease in subjective feelings of

sadness with greater recruitment of somatosensory brain areas, most likely reflecting focus on affect-related bodily sensations developed through mindfulness practice (Farb et al. 2010). But none of these studies was able to disentangle emotion-related effects of MBSR resulting from development of the accepting attitude from those attributable to attention training alone. In relation to this issue, research on advanced focused meditation training in expert Buddhist practitioners shows that stability of attention is associated with a decrease in automatic responding of emotion-related brain structures such as the amygdala (Brefczynski-Lewis et al. 2007).

In Buddhist training, implicit development of qualities such as acceptance and non-striving is combined with explicit conscious training targeting cultivation of compassion, loving kindness etc. This can result in an exceptional ability to induce these positive states voluntarily and maintain them with great intensity. Initial electrophysiological evidence supports the first-person reports of such changes. As documented by Lutz et al. (2004), advanced Tibetan Buddhist practitioners were able to induce and sustain state of non-referential compassion at will and this practice was associated with high-amplitude gamma frequency oscillations of the brain. This opens a largely unexplored area of therapeutic and mental health promoting applications of training in wholesome emotions. In Buddhist context, it is common that a teacher recommends positive-affect cultivating practices based on student's tendencies and abilities. Similarly, it is likely that some people would benefit more from explicit training in wholesome emotions alone or in conjunction with mindfulness. Preliminary evidence suggests differential effects of mindfulness and direct training in loving kindness. It has been found that previously depressed participants with high negative brooding benefited more from mindfulness (MBSR) training than direct loving kindness training and those participants with low negative brooding responded better to loving kindness meditation (Barnhofer et al. 2010).

Questions for Future Research

What specific interactions between systems of attention and emotion underlie beneficial emotion-related outcomes associated with mindfulness? Are there cognitive and personality variables which could predict whether an individual would benefit from mindfulness training alone, direct cultivation of wholesome emotions or combination of both? Can cultivation of wholesome emotions contribute to prevention of mental and physical illness? Are cognitive and neural substrates of loving kindness, compassion, rejoicing, and other wholesome emotions shared or dissociable to some extent?

Discerning Dimension of Mindfulness and the Cultivation of Insight

Ethical discernment is an inseparable part of development and application of mindfulness in Buddhist context. The “right mindfulness” arises if it is accompanied by mental faculties associated with self-respect, respect for others and conscience that distinguishes whether our thoughts, speech and actions are wholesome (Olendzki 2008). In turn, mindfulness provides the stability of mind which enables us to recognize negative mental patterns and behaviors and modify them through employment of other mental faculties. The central role of ethics in mindfulness is implied in the *Abhidhamma*, the main text on Buddhist psychology in Theravada. Here mindfulness is characterized as a mental factor that is “involved in any kind of meditation at any time to remove obstacles and enhance spiritual development” (Nyanaponika Thera 1998, p. 81–82).

It has been suggested that MBSR involves an implicit sense of ethics even though ethical discernment in the Buddhist sense is not directly discussed (Gilpin 2008). While MBSR mindfulness focuses on development of a decentered and deautomatized perspective of mental events, this alone may sometimes lead to recognition of negative mental patterns and maladaptive behavior (Baer 2003, p. 129). This may then result in changes of behavior in pathological conditions such as panic disorder or addictions (*ibid.*) and develop into better understanding of one's own interests and needs (Shapiro et al. 2006).

The increased awareness of our behavioral tendencies and growing familiarity with the works of mind relate to the role of mindfulness in development of insight and wisdom. Across different schools of Buddhism, mindfulness is viewed as a separate mental faculty from these. When mindfulness is developed to high degree, it can be applied in conjunction with meta-awareness in examination of mind. This can lead to a state of knowing, which in the Theravada tradition is marked by dissolution of even a subtle sense of “I or mine” and deep understanding of the interdependent arising of phenomena (Olendzki 2008). The Tibetan Buddhist tradition describes wisdom awareness (“*rigpa*”) as a radical shift in mental functioning towards usually dormant faculties of the deepest level of consciousness. This state is marked by clarity and luminosity of awareness beyond notions of “I” and “self” combined with the most noble qualities of wisdom and compassion towards all living beings (Dalai Lama 2000; Padmasambhava 1998).

Discussions about insight, wisdom and related concepts deserve extra care and sensitivity to differences in meaning when the same words are used in Buddhist discourse and in Western psychological context (see Rosch 2007). For example, some authors (e.g., Brown et al. 2007) have used

the term “insight” to describe the important shift in perspective from identification with our thoughts and feelings towards a more objective, witnessing mode of awareness developed in MBSR training. Such use of the term can be a source of confusion if we consider that in Buddhist Theravada discourse “insight” describes a very advanced state of consciousness marked by complete dissolution of the notion of an independent “self”. “Reperceiving,” a new term proposed by Shapiro et al. (2006), is therefore a more suitable reference to the meta-cognitive understanding resulting from mindfulness practice in MBSR.

Similarly, the decentered non-elaborative mode of processing developed in MBSR has been described as direct experience of mental and bodily events (Teasdale et al. 1995), direct observation of objects (Bishop et al. 2004, p. 233), and non-conceptual clear awareness (Brown et al. 2007). The terms “direct perception” or “non-conceptual clear awareness” are in Tibetan Buddhist context used in descriptions of practices of Dzogchen (“Great Seal”), considered as the pinnacle of Vajrayana teachings by many Buddhist practitioners and scholars (e.g., Dalai Lama 2000). Here these terms refer to experiences symptomatic of complete dissolution of the “observer-observed” dichotomy when the deepest level of wisdom awareness, having also quality of non-referential compassion, manifests itself. This state, when fully sustained, is in Tibetan Buddhist context regarded as enlightenment. So while mindfulness developed in Western psychological context can result in very valuable, both therapeutically and developmentally, understanding of the fleeting nature of mental phenomena (Shapiro et al. 2006), “insight” and “wisdom awareness” in Buddhism entail answers to much deeper questions about the nature of the observer, inner and outer phenomena, and the unchanging aspect of consciousness.

Cognitive and Neural Mechanisms

Investigation of cognitive and neural aspects of ethical discernment in meditation and its well-being related effects is a largely unexplored area. Research on factors related to the discerning dimension, such as empathy and altruistic behavior, points to regions in the posterior superior temporal cortex (Tankersley et al. 2007). It has also been proposed that self-control is a necessary component of altruistic behavior and, therefore, regions such as the lateral prefrontal cortex are likely to play an important role in altruism. Decision making is associated with executive functions localized in frontal lobes, including regions such as anterior cingulate cortex and dorsolateral prefrontal cortex (Fellows 2004), which are also involved in attention control. Decision making in meditators and its relationship to well-being can be an interesting and insightful topic of research extending explorations in this area.

Questions for Future Research

Does the ethical dimension of practice enhance beneficial health-related effects of mindfulness training? Some of the regions associated with attentional control and meta-awareness developed in mindfulness training are also implicated in decision making. What is the relationship between self-control related to discernment and development of attentional control and meta-awareness?

Summary

Attentional control applied in selective and sustained attention is the central component of mindfulness. Other faculties linked to intention and discernment, cultivation of wholesome emotions, and meta-awareness need to accompany mindfulness for it to fully develop. Bare attention is an aspect of mindfulness emphasized in MBSR and the Burmese school of Mahasi Sayadaw, but less prominent in other Buddhist schools. There are differences in the weight of mindfulness dimensions, their form and method of cultivation between MBSR and Buddhist schools other than the one MBSR originated from (see summary in Fig. 1). There are additional distinctions across MBSR approaches and Buddhist schools not discussed here, and the working model presented in Fig. 1 needs to be adjusted accordingly when applied to a specific tradition.

Recommendations for Research on Meditation-based Practices

Previous sections highlight three important issues for future research: (1) importance of a systemic approach, (2) careful distinctions between meditation practices, and (3) broadening of the spectrum of meditation-based techniques used in treatment.

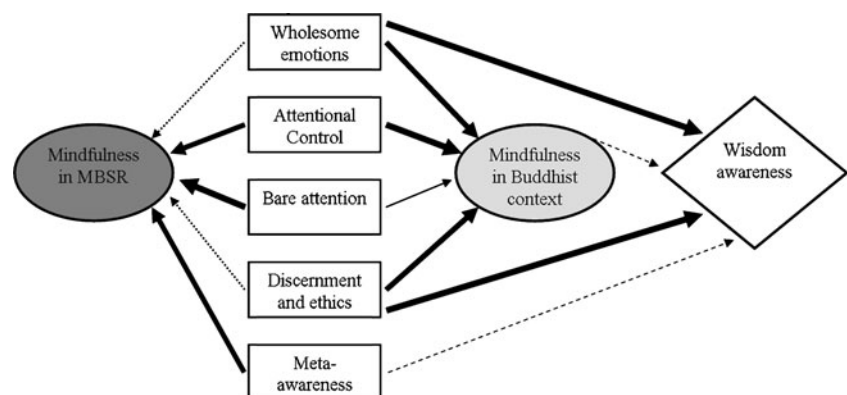
Cognitive and neuroscientific research usually requires rather narrow focus on a specific domain of cognitive

processing. This is exemplified by current studies of mindfulness that selectively examine changes in some aspects of attention or emotion. Investigation of the five dimensions of mindfulness I presented also aimed to highlight their interconnectedness. For example, bare attention is developed in conjunction with attentional control and both are, at least partially, responsible for beneficial effects of mindfulness on emotion processing. Approached from the opposite angle, attitude of acceptance and openness, including relevant thought patterns, likely creates favorable conditions for development of bare attention, etc. The links between these dimensions are further modified by the context of mindfulness practice which influences the strength of their contributions and involvement of additional factors such as ethical discernment. This needs to be taken into account in development of research hypotheses and interpretations of research results if we want to get a more accurate and complete picture of how mindfulness works and relates to well-being. Such systemic approach can also make differences due to context in which mindfulness is developed more visible.

Mindfulness training can take on different forms based on context in which it is practiced. The object and length of meditation sessions, as well as instructions, can differ vastly across mindfulness-based approaches and Buddhist schools. And practices, which may look same on the surface, can be associated with phenomenologically distinct states, and likely, different cognitive and neural correlates. Because of these differences, it is a necessity that research studies on meditation specify, in as much detail as possible, the tradition in which practitioners were trained and practices involved. Terms such as “Buddhist practitioners,” “mindfulness practitioners,” “focused meditation,” or “open meditation” are categories too broad for truly informative interpretation of findings.

Finally, research on meditation-based techniques relevant to well-being has mainly focused on mindfulness. A Buddhist practitioner, based on her training, may face a challenging experience by applying re-perceiving, inducing loving kindness and compassion, remembering illusory nature of appearances, or creating visualizations etc. Buddhist tradition

Fig. 1 Schematic depiction of mindfulness as developed in MBSR and in the traditional Buddhist context. Strength of lines represents the weight given to a particular dimension in mindfulness training. *Dotted lines* stand for more implicit contribution to development of mindfulness. *Dashed lines* mean that these faculties are applied in development of wisdom awareness.



encompasses wide range of meditative techniques targeting specific negative affective patterns that could be used without religious components and be valuable in focused clinical treatment (e.g., Sogyal Rinpoche 1992, p. 193–208). Research on cultivation of wholesome emotions including not only loving kindness, but also compassion, rejoicing, equanimity and other qualities, seems to be the most obvious extension of the current meditation-based methods. Further investigation of plasticity and voluntary control of cognition, especially in regard to emotion regulation, has the potential to become the most fruitful area of future meditation-related research.

Conclusion

Research on mechanisms of mindfulness, especially their cognitive and neural underpinnings, is still in its initial phase. At this point, refined distinctions between components and dimensions of mindfulness, as well as specifications of their interactions, are needed. I outlined a range of factors influencing mindfulness and considered how they take on different forms and roles in mindfulness developed in MBSR and in Buddhist context. I attempted to show that such distinctions are relevant to formulation of precise research hypotheses, interpretation of results and development of meditation-based intervention techniques tailored to specific conditions and people. Still, the working model proposed is only intended as an outline to be further refined, especially with regard to specifics of mindfulness-based approaches and Buddhist schools. This theoretical work needs to go hand in hand with more rigor and clarity in selection and descriptions of meditation techniques as well as participant groups in studies examining mindfulness and meditation. Such research has the potential to provide novel insights into voluntary control of cognition relevant to well-being, and perhaps, even fundamental questions about the nature of human experience and consciousness (Varela et al. 1991). Without a doubt, meditation research involves extra complexities since it is being built at the intersection of contemplative traditions and Western psychology and neuroscience. But, as the initial research indicates, it is well worth the effort.

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References

- Analayo, V. (2006). *Satipatthana: The direct path to realization*. Birmingham, UK: Windhorse Publications.
- Baer, R. A. (2003). Mindfulness practice as a clinical intervention: A conceptual and empirical review. *Clinical Psychology: Science and Practice, 10*, 125–143.
- Barnhofer, T., Chittka, T., Nightingale, H., Visser, C., & Crane, C. (2010). State effects of two forms of meditation on prefrontal EEG asymmetry in previously depressed individuals. *Mindfulness, 1*, 21–27.
- Bishop, S. R., Lau, M., Shapiro, S., Carlson, L., Anderson, N. D., Carmody, J., et al. (2004). Mindfulness: A proposed operational definition. *Clinical Psychology: Science and Practice, 11*, 230–241.
- Brefczynski-Lewis, J. A., Lutz, A., Shaefer, H. S., Levinson, D. B., & Davidson, R. J. (2007). Neural correlates of attentional expertise in long-term meditation practitioners. *Proceedings of the National Academy of Sciences, 104*, 11483–11488.
- Brown, K. W., Ryan, R. M., & Creswell, J. D. (2007). Mindfulness: Theoretical foundations and evidence for its salutary effects. *Psychological Inquiry, 18*, 211–237.
- Cahn, B. R., & Polich, J. (2009). Meditator (Vipassana) and the P3a event-related brain potential. *International Journal of Psychophysiology, 72*, 51–60.
- Carson, J. W., Carson, K. M., Gil, K. M., & Baucorn, D. H. (2004). Mindfulness-based relationship enhancement. *Behavior Therapy, 35*, 471–494.
- Christopher, M. S., Charoensuk, S., Gilbert, B. D., Neary, T. J., & Pearce, K. L. (2009). Mindfulness in Thailand and the United States: A case of apples versus oranges? *Journal of Clinical Psychology, 65*, 590–612.
- Corbetta, M., & Shulman, G. L. (2002). Control of goal-directed and stimulus-driven attention in the brain. *Nature Reviews Neuroscience, 3*, 201–215.
- Creswell, J. D., Way, B. M., Eisenberger, N. I., & Lieberman, M. D. (2007). Neural correlates of dispositional mindfulness during affect labelling. *Psychosomatic Medicine, 69*, 560–565.
- Dalai Lama, H. H. (2000). *Dzogchen*. Ithaca, NY: Snow Lion Publications.
- Davidson, R. J. (2010). Empirical explorations of mindfulness: Conceptual and methodological conundrums. *Emotion, 10*, 8–11.
- Farb, N. A. S., Segal, Z. V., Mayberg, H., Bean, J., McKeon, D., Fatima, Z., et al. (2007). Attending to the present: meditation reveals distinct neural modes of self-reference. *Social Cognitive and Affective Neuroscience, 2*, 313–322.
- Farb, N. A. S., Anderson, A. K., Mayberg, H., Bean, J., McKeon, D., & Segal, Z. V. (2010). Mindfulness training alters the neural expression of sadness. *Emotion, 10*, 25–34.
- Fellows, L. K. (2004). The cognitive neuroscience of human decision making: A review and conceptual framework. *Behavioral and Cognitive Neuroscience Reviews, 3*, 159–172.
- Frewen, P. A., Evans, E. M., Maraj, N., Dozois, D. J. A., & Partridge, K. (2008). Letting Go: Mindfulness and negative automatic thinking. *Cognitive Therapy Research, 32*, 758–774.
- Gilpin, R. (2008). The use of Theravada Buddhist practices and perspectives in mindfulness-based cognitive therapy. *Contemporary Buddhism: An Interdisciplinary Journal, 9*, 227–251.
- Goldin, P. R., & Gross, J. J. (2010). Effects of mindfulness-based stress reduction (MBSR) on emotion regulation in social anxiety disorder. *Emotion, 10*, 83–91.
- Ivanovski, B., & Malhi, G. S. (2007). The psychological and neurophysiological concomitants of mindfulness forms of meditation. *Acta Neuropsychiatrica, 19*, 76–91.
- Jha, A. P., Krompinger, J., & Baime, M. J. (2007). Mindfulness training modifies subsystems of attention. *Cognitive, Affective, & Behavioral Neuroscience, 7*, 109–119.
- Kabat-Zinn, J. (1990). *Full catastrophe of living*. New York: Delacorte Press.

- Kabat-Zinn, J. (2003). Mindfulness-based interventions in context: Past, present, and future. *Clinical Psychology: Science and Practice*, 10, 144–156.
- Kabat-Zinn, J., Lipworth, L., Burney, R., & Sellers, W. (1987). Four year follow-up of a meditation-based program for the self-regulation of chronic pain: Treatment outcomes and compliance. *Clinical Journal of Pain*, 2, 159–173.
- Kozhevnikov, M., Louchakova, O., Josipovic, Z., & Motes, M. A. (2009). The enhancement of visuospatial processing efficiency through Buddhist deity meditation. *Psychological Science*, 20, 645–653.
- Kristeller, J. L., Baer, R. A., & Quillian-Wolever, R. (2006). Mindfulness-based approaches to eating disorders. In R. A. Baer (Ed.), *Mindfulness-based treatment approaches* (pp. 75–93). Burlington, MA: Academic Press.
- Lutz, A., Greischar, L. L., Rawlings, N. B., Ricard, M., & Davidson, R. J. (2004). Long-term meditators self-induce high-amplitude gamma synchrony during mental practice. *Proceedings of the National Academy of Sciences*, 101, 16369–16373.
- Lutz, A., Dunne, J. P., & Davidson, R. J. (2007). Meditation and the neuroscience of consciousness: An introduction. In P. D. Zelazo, M. Moscovitch, & E. Thompson (Eds.), *Cambridge handbook of consciousness*. New York: Cambridge University Press.
- Lutz, A., Slagter, H. A., Dunne, J. D., & Davidson, R. J. (2008). Attention regulation and monitoring in meditation. *Trends in Cognitive Sciences*, 12, 163–169.
- Lutz, A., Slagter, H. A., Rawlings, N. B., Francis, A. D., Greischar, L. L., & Davidson, R. J. (2009). Mental training enhances attentional stability: Neural and behavioral evidence. *The Journal of Neuroscience*, 29, 13418–13427.
- Mitchell, D. W. (2002). *Buddhism: Introducing the Buddhist experience*. New York: Oxford University Press.
- Olendzki, A. (2008). *The real practice of mindfulness*. Buddhadharmā: The practitioner's quarterly. Retrieved December 11, 2009 from <http://www.thebuddhadharma.com/issues/2008/fall/mindfulness.php>.
- Padmasambhava. (1998). *Natural liberation*. Boston, MA: Wisdom Publications.
- Raichle, M. E., MacLeod, A. M., Snyder, A. Z., Powers, W. J., Gusnard, D. A., & Shulman, G. L. (2001). A default mode of brain function. *Proceedings of the National Academy of Sciences*, 98, 676–682.
- Ridderinkhof, K. R., van den Wildenberg, W. P. M., Segalowitz, S. J., & Carter, C. S. (2004). Neurocognitive mechanisms of cognitive control: The role of prefrontal cortex in action selection, response inhibition, performance monitoring, and reward-based learning. *Brain and Cognition*, 56, 129–140.
- Rosch, E. (2007). More than mindfulness: When you have a tiger by the tail, let it eat you. *Psychological Inquiry*, 18, 258–264.
- Samuelson, M., Carmody, J., Kabat-Zinn, J., & Bratt, M. A. (2007). Mindfulness-based stress reduction in Massachusetts correctional facilities. *The Prison Journal*, 87, 254–268.
- Shapiro, S. L., Carlson, L. E., Astin, J. A., & Freedman, B. (2006). Mechanisms of mindfulness. *Journal of Clinical Psychology*, 62, 373–386.
- Shapiro, S. L., Oman, D., Thoresen, C. E., Plante, T. G., & Flinders, T. (2008). Cultivating mindfulness: Effects on well-being. *Journal of Clinical Psychology*, 64, 840–862.
- Siegel, R. D., Germer, C. K., & Olendzki, A. (2008). Mindfulness: What is it? Where did it come from? In F. Didonna (Ed.), *Clinical handbook of mindfulness*. New York: Springer.
- Slagter, H. A., Lutz, A., Breischar, L., Francis, A. D., Nieuwenhuis, S., Davis, J. M., et al. (2007). Mental training affects distribution of limited brain resources. *PLoS Biology*, 5, 1228–1235.
- Sogyal Rinpoche (1992). *The Tibetan book of living and dying*. New York, NY: HarperCollins Publishers.
- Tankersley, D., Stowe, C. J., & Huettel, S. A. (2007). Altruism is associated with an increased neural response to agency. *Nature Neuroscience*, 10, 150–151.
- Teasdale, J. D., Segal, Z. V., & Williams, J. M. G. (1995). How does cognitive therapy prevent depressive relapse and why should attentional control (mindfulness) training help? *Behaviour Research and Therapy*, 33, 25–39.
- Teasdale, J. D., Moore, R. G., Mayhurst, H., Pope, M., Williams, S., & Segal, Z. V. (2002). Metacognitive awareness and prevention of relapse in depression. *Journal of Consulting and Clinical Psychology*, 70, 275–287.
- Thera, N. (1962). *The heart of Buddhist meditation: A handbook of mental training based on the Buddha's way of mindfulness*. London: Rider & Co.
- Thera, N. (1998). *Abhidhamma studies: Buddhist explorations of consciousness and time* (4th ed.). Wisdom Publications: Boston, MA.
- Varela, F. J., Thompson, E., & Rosch, E. (1991). *The embodied mind*. Cambridge, MA: The MIT Press.
- Wallace, B. A. (1999a). The Buddhist tradition of Samatha: Methods for refining and examining consciousness. *Journal of Consciousness Studies*, 6, 175–187.
- Wallace, B. A. (1999b). *The four immeasurables: Cultivating a boundless heart*. Ithaca, NY: Snow Lion Publications.
- Wells, A. (2002). GAD, metacognition, and mindfulness: An information processing analysis. *Clinical Psychology: Science and Practice*, 9, 95–100.