

Theoretical and Methodological Contributions of Buddhism to Psychology and Neuroscience

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Buddhism, Positive Psychology, and Social Neuroscience:

Since their inception, Western psychology and neuroscience have been characterized by studying people who deviate negatively from common ways of thinking and behaving. Examining deviant patterns of thought and behavior affords meaningful contrasts to normality by which scientists can and have learned a great deal about mind and brain. The primary focus for psychology and neuroscience has been various kinds of distressing, detrimental, or otherwise maladaptive deviations. The investigation of topics such as criminality, insanity, mental illness, and brain disorders have been considered of greater scientific and societal value than altruism, genius, cognitive flourishing, and brain vitality. On the other hand, the investigation of patterns of thought and behavior that deviate from normality in constructive and adaptive ways, also known as “positive deviance”, has been largely neglected.

The tendency to study maladaptive, rather than adaptive, forms of deviance has long been recognized as a predilection of the Western sciences. The sociologist Pitirim Alexandrovich Sorokin wrote that, “Western science has paid scant attention to positive types of human beings, their positive achievements, their heroic actions, and their positive relationships” (1948). As a result, an accurate description of positively deviant persons are lacking in Western psychology and neuroscience. This lack may be especially significant in the current era of scientism, where scientific questions and answers govern people’s view of themselves, others, and their world. Moreover, a circumscribed focus on maladaptive expressions of the human mind has constrained scientific models of mind, brain, and human potential. This limited investigation at the level of basic research has also limited clinical assessment, diagnosis and intervention. Significantly, Buddhism and Buddhist practitioners have recently played a role in scientific understanding of the human mind that is broader than was described by earlier scientific models.

Studies of negative deviance are a natural response to suffering in its variety of forms. Indeed, the Abhidhamma lists more maladaptive, than adaptive, mental states (Bodhi, 2000). On one hand, there is a great deal that can be learned about the mind and brain from studying maladaptive behaviors and deficits in neural and cognitive functioning. The history of psychology and neuroscience is ripe with stories from which much has been gleaned precisely because of functional deficits.

On the other hand, the systematic study of positive deviance may likewise provide insights that can help alleviate suffering. For example, the Abhidhamma includes an extensive description of wholesome mental factors, such as the seven factors of enlightenment (Bodhi, 2000). Developing a thorough investigation of the healthier and healthiest minds could explicate latent potentials of mind and brain. A science that includes the study of positively deviant minds (and brains) has already contributed novel interventions for clinical populations as well as for facilitating people’s development from healthy to healthier.

Western models of the mind have long been founded on a premise of one brain existing as independent from other brains, utilizing the analogy of the solitary desktop computer (Cacioppo & Hawley, 2009). Moreover, the goal of clinical attention has been

primarily to aid an individual's achievement of self-sufficiency. Studying human mind and brain at the level of analysis of the individual has afforded a vast and valuable body of knowledge. Yet the systematic study of the interdependence of minds and brains has been sidelined. By foregrounding human separateness in both basic and applied research, the verity of a person's connection to others and the world has been deemphasized or disregarded entirely.

The incompleteness of the scientific scope is particularly relevant in this era of scientism, where the belief that science alone can provide answers saturates mainstream Western thinking and scholarship (Wallace, 2000). People who live from the perspective of scientism view themselves and their world almost exclusively through a scientific lens, even relying on science as a source of moral guidance (Wallace, 2000). It may not be surprising then that this wave of scientific research, characterized by myopic focus on psychological problems, deficits in functioning, and the brain as a solitary entity, has coincided with a rise in mental illness (WHO World Mental Health Survey Consortium, 2004) and loneliness (McPherson, Smith-Lovin, & Brashears, 2006). If science dictates to a large degree people's beliefs about what is good and true, limitations in the scope of scientific investigation may in turn limit how members of society view themselves, others, and the world around them.

Recently, Western scientists have begun to acknowledge the importance of studying human virtues as rigorously and deeply as they have studied human vices. This movement, known as *positive psychology*, aims to understand the causes and conditions that give rise to human virtues and positive functioning. Even more recently, scientists began to systematically build a science of social connection, in stark contrast to previous scientific models of the human mind which emphasized one's separateness from others and the world. *Social neuroscience* is this pioneering science of social connection which is corroborating human interdependence using cutting-edge methodologies to study the social character of the human brain. Buddhism and Buddhist practitioners have contributed to understanding the potential for human connection within this pioneering field of investigation.

Buddhism's contributions to psychology and neuroscience have been primarily in the form of positively deviant constructs, experimental manipulations, and clinical interventions. Moreover, practitioners of Buddhist contemplative practices can be thought of as populations from which to recruit individuals with positively deviant cognitive processing. Both positive psychology and social neuroscience have benefited from studies incorporating Buddhist practitioners who demonstrate virtues such as wisdom, compassion, mindfulness, and concentration. Studying practitioners provides a scientific understanding of the human potential for virtuous intentions and behaviors. This effort has increased the prevalence of empirical studies on virtues such as equanimity (Nielson & Kaszniak, 2006), loving-kindness (Hutcherson, Seppala, & Gross, 2008), and compassion (Lutz, Brefczynski-Lewis, Johnstone & Davidson, 2008). This paper reviews key findings from positive psychology and social neuroscience which have been facilitated, theoretically and/or methodologically, by the study of Buddhist practices and practitioners. It then suggests directions for future research that can further leverage Buddhist teachings and practitioners to make contributions relevant to building more harmonious societies.

Theoretical Contributions:

Buddhism offers an alternative model to Western notions of well-being, higher stages of development, and the developmental course towards realizing one's potential. In this way, contemplative psychological science affords a perspective which has informed and may as yet go beyond mainstream, positive psychological understanding. The Buddha offers an example of the potential for human beings to realize well-being through mental discipline,

self-transcendence, and altruistic intention and action. Moreover, Buddhism provides an extensive paradigm for human development. Systematic mental training may be seen to facilitate the development and manifestation of virtuous character and behavior through simultaneously uprooting unwholesome mental states and supporting the expression of wholesome mental states.

The Buddha taught a great deal about the importance of training one's mind. Right Effort, Right Mindfulness and Right Concentration are Buddhist virtues that concern the benefit of training attention (Grossenbacher & Quaglia, 2010). Buddhist practices for mental training, or meditation, have provided novel experimental manipulations and constructs for studying positively deviant forms of attentional processing. The study of meditation has contributed to an understanding of the neural and cognitive mechanisms underlying superior attentional processing.

The study of mindfulness in psychology and neuroscience stems from Buddhist teachings. Both basic and applied research has examined the influence of mindfulness as a state, trait, type of meditation and clinical intervention (Davidson, 2010). A great deal of research on mindfulness and mental training has focused on attentional processing, which is often seen as the most direct target of meditation. However, a surprising proportion of mindfulness and mental training research has concerned other aspects of the human mind. Indeed, an entire 2010 issue of the peer-reviewed journal *Emotion* was dedicated to empirical reports at this intersection of mindfulness, mental training, and affective processing (Davidson, 2010). Mindfulness has been also been studied with regards to memory (Jha, Stanley, Kiyonaga, Wong, & Gelfand, 2010), pain sensitivity (Grant, Courtemanche, Duerden, Duncan, & Rainville, 2010), visual discrimination (MacLean, Ferrer, Aichele, Bridwell, Zanesco, Jacobs, et al., 2010), worldview (Niemic, Brown, Kashdan, Cozzolino, Breen, Levesque-Bristol, & Ryan, 2010), and social cognition and behavior (Hutcherson et al., 2008).

One explanation for the vast number of other constructs associated with differences in mindfulness is that mindfulness is a cognitive construct, situated straightforwardly in the field of cognitive psychology. Psychology and neuroscience are accustomed to thinking about cognitive traits and mechanisms as the roots which underlie dysfunction and mental illness. The novelty of mindfulness is that it is a cognitive trait associated with superior functioning and mental health. Therefore, the study of individuals with high levels of mindfulness may reveal the cognitive mechanisms underlying high levels of mental and emotional well-being.

Trait mindfulness has been correlated with differences in brain activation during emotional regulation. This research suggests neural mechanisms which may support advanced emotional regulation. In particular, trait mindfulness correlated with greater widespread prefrontal cortical activation and reduced bilateral amygdala activity during affect labeling (Creswell, Way, Eisenberger & Lieberman, 2007). In participants high in mindfulness but not in participants low in mindfulness, there was a strong negative association between activation in areas of prefrontal cortex and right amygdala activation (Creswell et al., 2007). This suggests that executive functions may exert a greater influence on emotional processing when mindfulness is high versus low. In a related study, individual differences in trait mindfulness predicted dorsomedial prefrontal activation that was inversely correlated with amygdala response to negative stimuli (Modinos, Ormel, & Aleman, 2010). Together these results suggest that the role of prefrontal cortex in emotional regulation may grow alongside mindfulness, as previously automated amygdala responses to negative stimuli become subject to conscious awareness and inhibition. Consequently, individuals high in mindfulness can help neuroscientists better understand neural mechanisms underlying positively deviant emotional regulation.

Anatomical differences in the brain's structure have also been associated with mental training. Structural differences have been found to correlate with long-term meditation in many different regions of the brain, including but not limited to, the right orbito-frontal cortex (Luders, Toga, Lepore & Gaser, 2009), right hippocampus (Holzel, Ott, Gard, Hempel, Weygandt, Morgan & Vaitl, 2008), right anterior insula (Lazar, Kerr, Wasserman, Gray, Greve, Treadway, McGarvey, Quinn et al., 2005), and anterior cingulate cortex (Grant, Courtemanche, Duerden, Duncan, & Rainville, 2010). This line of research involving mental training has contributed to the understanding of neuroplasticity (the capacity of the brain to change with experience). The Buddhist path of meditation, by virtue of its systematic approach and repeated application, may be particularly influential on the brain's structure. Engaging experience consistently and repetitively with daily meditation practice may facilitate neuroplasticity more than less systematic approaches to mental training, such as meditating only when one feels particularly motivated.

Overcoming selfish desires to instead focus on the well-being of others is a primary goal of Buddhist practice. Moreover, perceiving the self as an unfolding process, rather than a stable object, is said to alleviate suffering. Buddhism has contributed these ways of understanding the self to psychology and neuroscience such that many models of ego development include stages in which a person transcends self-centeredness (e.g., Cook-Greuter, 2000).

A well-known construct in psychology is "self-esteem", defined as one's evaluation of one's self. Buddhist philosophy has been utilized to critique the usefulness of this construct for promoting mental health and suggest alternative ways of perceiving the self (Ryan & Brown, 2003). Indeed, both high and low self-esteem are seen as problematic from the Buddhist perspective, because one's well-being is consequently subject to an inevitable flux in circumstance, social praise or criticism, and other changes outside one's control (Ryan & Brown, 2003).

Mental training has been found to correlate with differences in how one relates to one's experience and the prioritization of self-concept. Training in Vipassana meditation for one week was found to improve self-representation and promote more mature deployment of ego defense mechanisms related to coping with common stressors (Emavardhana & Tori, 1997). Mindfulness training has also been found to alter the neural expression of how one thinks about one's self (self-referential processing). Eight weeks of mindfulness training resulted in a decoupling of networks devoted to narrative self-referential processing and experiential self-referential processing (Farb, Segal, Mayberg, Bean, McKeon, Fatima, & Anderson, 2007). Mindfulness training has also been associated with a distinct neural response to sadness-provoking stimuli (Farb, Anderson, Mayberg, Bean, McKeon, & Segal, 2010). Control participants displayed less activation in areas of the brain implicated in somatic processing than did mindfulness meditators. This wider recruitment of somatic networks during sadness was correlated with lower depression scores (Farb et al., 2010). Together these studies suggest that experiential (nonconceptual) self-referential processing, assisted by mindfulness meditation, may reduce the unfavorable effects related to narrative (conceptual) self-referential processing. Said differently, the findings support a view that decreased conceptual processing alongside increased nonconceptual processing of one's experience may lessen certain kinds of suffering.

Mindfulness may in and of itself be characterized by reduced attachment to one's self-concept. Trait mindfulness has been correlated with reduced worldview defensiveness and self-esteem striving in the face of mortality salience (Niemic et al., 2010). Importantly, mindfulness seems to predict the degree to which an individual will process death-related thoughts. The more these thoughts are processed consciously, the less verbal defensiveness is present (Niemic et al., 2010). These studies on mindfulness and worldview defensiveness

suggest a novel way to attenuate feelings of fear associated with one's own mortality, which could have important implications for the field of clinical psychology.

Generosity, loving-kindness, and compassion are examples of prosocial virtues Buddhism espouses as contributing to personal happiness and well-being. Buddhism presents a vision for well-being that depends on holding intentions and performing actions primarily for the sake of others rather than for one's self. Living virtuously, for the benefit of others, is seen to facilitate one's own happiness. Importantly, the field of social neuroscience has found that individuals who perceive themselves as being social disconnected (lonely) interpret social information in a more egocentric fashion than those who see themselves as being connected to others (not lonely; Cacioppo & Hawkley, 2009). Moreover, this feeling of loneliness can spread up to three degrees in a person's social network (Cacioppo, Fowler, & Christakis, 2009). Personal cultivation of altruistic emotions, intentions, and behaviors may therefore provide an important antidote to the loneliness found throughout the West. Buddhism continues to contribute the view that being less concerned for one's self and caring more for others promotes personal and collective well-being and mental health.

A growing tide of research on compassion has largely been the result of Buddhist teachings on its societal value. Enhanced neural response in areas of the brain previously associated with empathy was found during compassion meditation versus rest in advanced and novice meditators during the presentation of emotional sounds, such as a baby crying (Lutz et al., 2008). Compared with novices, advanced meditators demonstrated significantly greater activation to negative versus positive or neutral affective sounds (Lutz et al., 2008). This neuroscience research on Buddhist practitioners supports a view that social cognition can be altered in important ways through voluntary shifts in emotional processing. Subsequently, these endogenous shifts in thinking about others' suffering could result in more altruistic action.

A science of social connection may benefit from studying the verbal reports of experienced meditators, since the complexity of relationship can involve myriad interpersonal dynamics unfolding across multiple time scales. Content analysis of interviews with advanced meditators revealed that meditation may alter the perception of interpersonal dynamics, decreasing reactivity, promoting freedom and safety, and enhancing understanding of social connection (Pruitt & McCollum, 2010). At this early stage, such verbal reports from meditators can inspire social neuroscience research into causes and conditions that aid positively deviant social connection.

Feelings of loneliness may also be attenuated through enhancing one's feelings of connection with others, even strangers. If feelings of social connection are understood as being partially within one's control, then loneliness may become less psychologically and physiologically disabling. Buddhist loving-kindness practices were demonstrated to increase implicit and explicit feelings of positivity and connection to pictures of novel individuals compared to control practices (Hutcherson et al., 2008). These results further corroborate the idea that voluntary shifts in emotional and cognitive processing can confer beneficial changes in social cognition. The increased social connection facilitated by Buddhist practice may not only enhance feelings of connection, it may provide helpful interventions for excessive loneliness.

Methodological Contributions:

The acceptance and incorporation of mental training into psychology and neuroscience has afforded new constructs, clinical interventions, and experimental manipulations. The paradigm of mental training to cultivate virtue provides a pivotal starting point for positive psychological interventions. Because the majority of techniques and

interventions psychology has developed were created to address mental illness and other psychological deficits, Buddhist emphasis on techniques for cultivating wholesomeness can and have contributed to a more comprehensive psychological science.

Moreover, studying neural mechanisms underlying various cognitive functions has often depended on fortuitous accidents of mind and brain dysfunction rather than controlled experimental manipulations targeting specific mental functions. A recently popularized method of utilizing dysfunction to study mind and brain is Transcranial Magnetic Stimulation, which temporarily induces activation changes in a localized area of the healthy human brain. Through momentarily disrupting the functioning in certain areas, neuroscientists have been able to discern mental functions associated with those areas. The limitations of this approach include the incapacity to induce nuanced differences in localized activation. Mental training, correlated with activation changes in specific networks of the brain, could be used to systematically alter the activation of these networks in more subtle ways. These subtle changes in specific areas of the brain could afford refined understanding of mental functions associated with those areas.

The recognition of nonconceptual forms of development has led to the definition and operationalization of new constructs with meaningful intra- and inter-individual variation. As discussed earlier, the psychological construct of mindfulness was inspired by Buddhism. Nevertheless, the scientific measurement of mindfulness required the creation of new methodologies. Many measures of mindfulness as a state and a trait have since been developed (e.g., State and Trait Mindful Attention and Awareness Scale; Brown & Ryan, 2003; Kentucky Inventory of Mindfulness Skills; Baer, Smith, & Allen, 2004). State mindfulness measures aim to quantify the extent to which a person is being mindful at the time of taking the assessment. Trait mindfulness scales, on the other hand, aim to quantify the extent to which a person tends to be mindful in a reliable manner throughout their daily life.

Another psychological construct derived from Buddhist teachings has been nonattachment, providing a new lens from which to examine Western models of attachment (Sahdra, Shaver, & Brown, 2010). The Nonattachment Scale (NAS) was developed with reference to historical and contemporary Buddhist scholarship and includes items such as, "I can enjoy pleasant experiences without needing them to last forever" and "I can enjoy my family and friends without feeling the need to hang on to them" (Sahdra, et al., 2010). Scores on the NAS have been correlated to mindfulness, acceptance, self-compassion, and well-being (Sahdra et al., 2010). In contrast to the idea that less attachment to others may decrease connection with them, NAS scores were inversely related to the avoidance of intimacy in relationships and positively correlated with empathy, generosity, and social connectedness (Sahdra et al., 2010). The finding that nonattachment from mental fixations is associated with positive personal and interpersonal outcomes challenges the Western understanding that secure attachment depends primarily on the successful maintenance of positive concepts about self and other.

Mental training has provided viable experimental manipulations which are important for studying variables central to cognitive psychology and neuroscience. Experimental manipulations involve randomly assigning participants to experience certain conditions (e.g., meditation for one hour versus sleep for one hour). These conditions can then be compared with each other to discern the causal effects of each condition. As discussed earlier, improvements in attentional processing have been associated with meditation. The capacity of meditation to produce reliable and predictable improvements in cognitive processes such as attention allows for it to be utilized as an experimental manipulation of attentional processing. By assigning participants to meditate or to a wait-list control (in which participants wait to receive meditation instruction only after the study is complete),

investigators can discern specific physiological, anatomical, experiential, and functional changes which may coincide with meditation-induced improvements in cognitive processes. In turn, these findings can inform basic understanding of these changes and their role in cognition more broadly.

For example, practitioners with three months of intensive mindfulness training demonstrated improved performance compared to baseline on a well-known task designed to measure a particular aspect of attention (Slagter, Lutz, Greischar, Francis, Nieuwenhuis, Davis & Davidson, 2007). Further research involving EEG during this task found that meditators displayed more skillful distribution of their brain resources (Slagter, Lutz, Greischar, Nieuwenhuis, & Davidson, 2009). In addition to supporting a known cognitive theory, the overinvestment hypothesis (Olivers and Nieuwenhuis, 2006), the positive deviance in attentional processing resultant from mental training enabled researchers to study the neural mechanisms underlying superior attentional performance. Finally, these findings demonstrated that intensive mental training could attenuate a well-known deficit of normative cognition.

Practices which train attention are not the only experimental manipulations motivated by Buddhism. Emotional differences reliably associated with certain types of meditation can also be utilized to learn more about mind and brain. For example, loving-kindness (*mettā*) meditation provided a method for systematically increasing positive emotions (Fredrickson, Cohn, Coffey, Pek, & Finkel, 2008). By randomly assigning participants to either a loving-kindness meditation or a wait-list control, researchers were able to ascertain a variety of constructive effects associated with increasing positive emotions (Fredrickson et al., 2008), effects that may otherwise have been confounded with variables such as socioeconomic status, health, and education.

Studying individuals who have mental expertise in a discipline involving extensive cultivation of prosocial intentions and emotions provides a way to investigate the human potential for virtue. Previous attempts at such an investigation would have required reliance on self-report and/or behavioral measures of prosociality to discern individual differences. On the other hand, contemplative practitioners who have systematically cultivated altruistic intentions and emotions, such as compassion or *mettā*, provide more objective positively deviant differences in social cognition. Similarly, contemplative practices can serve as experimental manipulations of positive social cognition (e.g., compassion) in nonmeditating populations (e.g., Lutz et al., 2008). Therefore, these practitioners may more consistently exhibit these differences than individuals who simply score high on self-report measures of prosociality.

Studying the minds of contemplative practitioners has contributed in important ways to both clinical and non-clinical populations. Moreover, the study of contemplative practices has resulted in findings relevant to individuals who may not even be interested in adhering to a contemplative practice. The investigation of healthy minds has even inspired novel clinical interventions, corroborating the value of studying positive deviance for alleviating suffering in addition to promoting cognitive, emotional, and social development.

One reason that clinical psychology has benefited from contemplative research is the alignment between Western cognitive approaches to interventions and the largely cognitive character of Buddhist constructs and interventions. While other reviews have focused on the significance of mindfulness to clinical psychology (see Baer, 2003), the present paper aims to more specifically address how this incorporation has been facilitated by the distinctly cognitive nature of Buddhist teachings. Mindfulness may be thought of as a positively deviant, nonconceptual cognitive trait, differing from many other constructs of positive psychology which primarily concern positive emotions or positive conception (e.g., happiness, optimism). Buddhist teachings fit well within the current scope of clinical

psychology, which is largely grounded in interventions which target maladaptive cognitive processing.

For example, Cognitive Behavioral Therapy (CBT) aims to contest maladaptive thoughts that are rooted in well-known cognitive biases. CBT thus aims to alter the content of thought. However, cognitive psychology has investigated constructs such as attention and working memory that chiefly contribute to the context, rather than the content, of thinking. Mindfulness is one construct that directly relates to this cognitive context. Moreover, mindfulness is a construct that describes superior functioning within underlying, contextual domains of processing such as attention and awareness.

Consequently, mindfulness concerns altering the context in which thinking is embedded, complimenting the approach of CBT. Not surprisingly, mindfulness has been incorporated into cognitive interventions. Mindfulness-Based Cognitive Therapy (MBCT; Segal, Williams, & Teasdale, 2002), Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999), and Dialectical Behavior Therapy (DBT; Linehan, 1993) are all forms of clinical intervention which draw upon Buddhist teachings and could be characterized as targeting cognitive mechanisms related to problematic cognitive content as well as deficits in the cognitive context. Perhaps by virtue of targeting cognitive processes more broadly than mere content, the value of interventions drawing upon Buddhist teachings and thought are substantial (see Baer, 2003). Moreover, the scope of clinical diagnoses for which Buddhist-based interventions may be effective continues to grow as more studies demonstrate their efficacy. For example, a preliminary study found that meditation may assist children and adults with Attention Deficit Hyperactivity Disorder (ADHD; Zylowska, Ackerman, Yang, Futrell, Horton, Hale, Pataki, & Smalley, 2008).

Finally, the relevance of Buddhist teachings to clinical psychology holds promise for helping clinicians, not just their clients. Most, if not all, clinical interventions rely on a capacity of the clinician to notice, be aware of, and hold nonjudgmentally the symptoms of a particular client. Moreover, the clinician must maintain attention to the client throughout an hour-long session. Increasing research into the influence of meditation on social cognition and functioning may reveal effects that could further enhance therapeutic alliance, interpersonal attunement, empathy, and co-regulation. Because common factors have also been demonstrated to be related to therapeutic outcomes (Bohart, Elliot, Greenberg, & Watson, 2002), there is potential for Buddhist-based mental training to be increasingly engaged as part of clinical training and education.

Future Directions: Buddhism and Positive Social Neuroscience:

A primary reason for the growing investigation into meditation and mindfulness is its relevance to clinical and non-clinical populations alike. Psychology and neuroscience have benefited from investigating mindfulness and mental training in both applied (e.g., MBCT) and basic (e.g., MacLean et al., 2010; Fredrickson et al., 2008) research. Consistent with the premise of positive psychology, research on mindfulness and mental training has focused on individuals who positively deviate from average levels of functioning. Mindfulness can be seen as a positive cognitive trait and is correlated with a number of other favorable cognitive attributes. Individuals with extensive experience in mental training have demonstrated superior performance on a variety of cognitive tasks (Valentine & Sweet, 1999; Moore and Malinowski, 2009; MacLean et al., 2010; Slagter et al., 2009). As discussed, mental training can be utilized in positive psychological experimental manipulations and interventions which can facilitate the study of cognition and emotion (e.g., Slagter et al., 2009; Fredrickson, et al., 2008).

Novel findings associated with mindfulness and mental training have contributed to theory and research on attentional processing. These findings demonstrate that processing in other domains, such as emotional processing, improves alongside improvements in attentional processing. The investigation of negatively deviant attention and emotional regulation has yielded insight into their roles for successful social cognition and functioning. For example, issues with social functioning are prevalent in children diagnosed with ADHD (De Boo & Prins, 2007). Little research, however, has concerned the influence of positively deviant attentional processing in social contexts.

Compared with research on mental training and emotion or attention, a review of 320 articles concerning mindfulness and meditation reveals that social cognition and functioning have been studied considerably less (see Figure 1). A next step for the field of research on mindfulness, meditation, and other forms of mental training may be to explicate effects on social cognition and functioning, as inspired by effects on attention and emotion previously demonstrated. An expansion of research on contemplative constructs, experimental manipulations, and clinical interventions into the domain of social processing would help to bridge the gap between personal benefits of mental training and benefits to society as a whole. More specifically, studying how one individual's contemplative practice may benefit those with whom they interact could further substantiate the benefits of training one's mind. Studying mindfulness, meditation, and other contemplative practices in social contexts foregrounds the reality of interdependence. The investigation of interpersonal benefits resultant from mental training may further provide encouragement for therapists, teachers, parents, and other members of society to practice meditation, not solely for their own benefit, but for the benefit of all beings.

Through studying individuals who have consciously cultivated a perspective of caring more for others, Buddhism may continue to contribute to a positive social neuroscience in which positively deviant social cognition and functioning is investigated for its relevance to improving social connection for people at all levels of functioning. As social neuroscience continues to reveal the interdependent nature of mental illness and mental well-being, Buddhism may help guide an exploration of positively deviant interpersonal interaction, close relationships, virtuous intentions and actions, and further forms of prosociality.

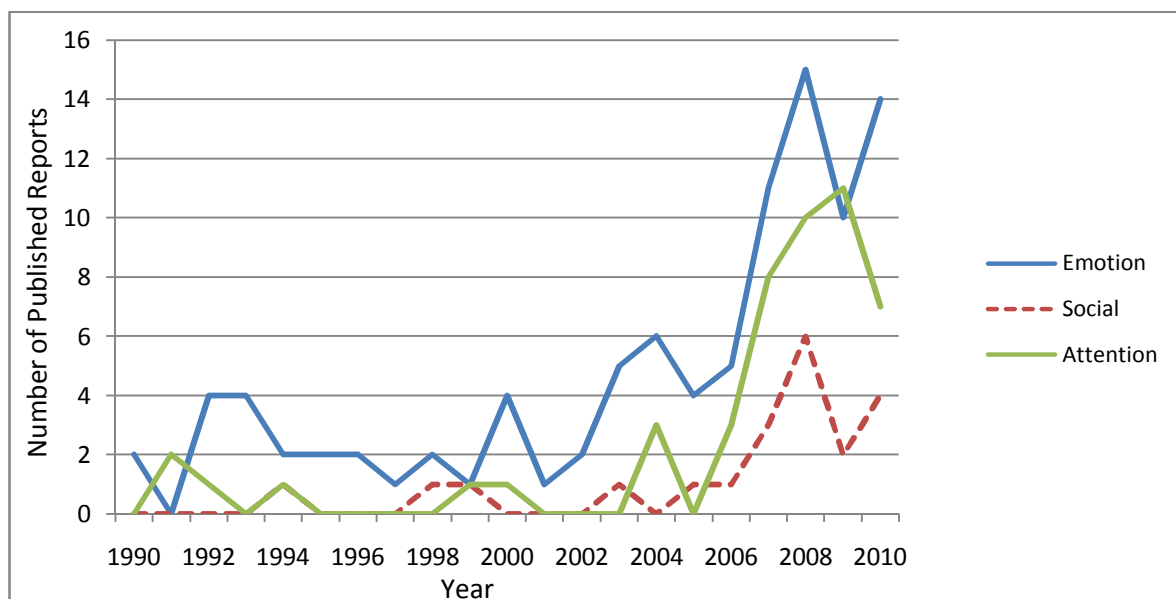


Figure 1: Empirical Reports on Meditation/Mindfulness and Emotion, Attention, or Social Processing

Buddhism, Science, and Harmonious Societies:

Western science continues to inform many aspects of society, from government policy and funding to personal well-being and lifestyle choices. Buddhism has recently started to play a striking role in broadening psychology and neuroscience, facilitating the study of human virtue both theoretically and methodologically through novel constructs, experimental manipulations, and clinical interventions. Through focusing further on human virtues and positively deviant functioning, a Buddhist-informed psychology and neuroscience may continue to shed light on questions that contribute to more harmonious societies.

From a myopic concentration on negative deviance to an inclusive awareness of the whole range of human functioning, the broadening within scientific investigation may enable a broadened outlook within society—especially for those in the West and elsewhere who look to science for guidance on what is good and true. The fields of positive psychology and social neuroscience may serve to translate models of the mind, such as those provided by Buddhism, which describe further reaches of mental and emotional well-being, into a secular language that can benefit Buddhists and non-Buddhists alike.

Buddhism may continue to contribute value associated with understanding, investigating, and realizing positively deviant being, behavior and functioning. Buddhist-informed research may itself broaden to describe the relevance of mental training to alleviating suffering caused by social disconnection. By investigating contemplative states, traits, experimental manipulations, and clinical interventions as they pertain to positive social connection, Buddhist practitioners may serve to bridge the fields of positive psychology and social neuroscience. Through focusing further on the influence of mindfulness, mental training, and the systematic cultivation of prosocial intentions and emotions, Buddhism could facilitate a distinctively positive social neuroscience. Together, Buddhism, positive psychology, and positive social neuroscience can strengthen attention to human functions that contribute to harmonious societies through encouraging the rigorous investigation of human virtues.

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